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THE

MANAGEMENT OF LABOR

AND OF

THE LYING-IN PERIOD.

A GUIDE FOR THE YOUNG PRACTITIONER.

BY

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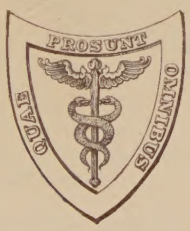

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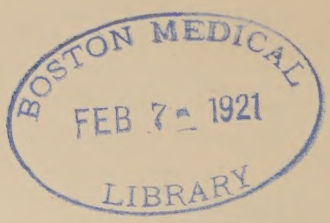

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PREFACE.

An obstetrical treatise is usually written with a double purpose; to serve as a text-book for students and as a practical guide for the physician at the bedside. Hence it commonly happens that only one of these objects is attained. If it is a good book for the student, it is apt to be too simple to serve the practitioner in the management of complicated cases; if it is a fund of clinical information, and serviceable in the latter way, it is apt to be hard of comprehension for the student. The aim of this book is to serve as a guide to practice, divested of all superfluous or irrelevant details. It takes for granted an acquaintance with the anatomy and physiology of the parts involved, and of the mechanism of normal labor; alluding to such subjects only when a right understanding of them is necessary to explain and justify the course recommended. It does not aspire to be a book of reference for obstetric history, but modestly to say to the physician:

> "Si quid novisti rectius, istud candidus imperti,
> Si non, his utere mecum."
>
> Let this not lie unread upon the shelf,
> Unless you know some better way yourself.

H. G. L.

Columbus, Ohio.

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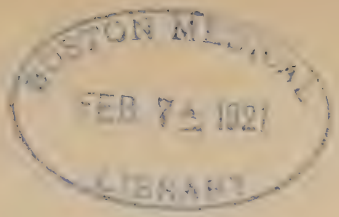


THE CONDUCT OF LABOR.

CHAPTER I.

THE NORMAL STANDARD.

There are many who regard labor as a strictly physiological process, and who, therefore, deprecate any interference with it as long as any hope exists of the woman finishing her task unaided. Of such, Blundell was and is the apostle; summing up the faith in the declaration, "meddlesome midwifery is bad." This apparently harmless motto is by many so construed as to make any manual assistance a meddlesome act, and practically to reduce the function of the accoucheur to witnessing callously the struggles of the parturient woman until either "nature" shall have terminated it by delivery or until her evident exhaustion shall have made interference an obvious necessity. Inasmuch as this view is only too prevalent, partly from the speciousness of its logic and partly because it is a tower of refuge for ignorance, it will be well to begin our subject with some statement of the reasons for assisting labor, and of the character and duration of what may fairly be called normal labor.

In an ideal labor the process begins with apparent

suddenness, the woman being in good health at the time; rhythmic contractions of the womb begin and continue until: 1, the os uteri is fully dilated; 2, the membranes rupture and the liquor amnii escapes; 3, the child is expelled; and, 4, the placenta and attached membranes are extruded; 5, last but not least, the womb and all tissues enlarged and altered by pregnancy return to their usual size and condition, leaving the woman in the same condition, as to health, as before the reproductive process began. These rhythmic contractions occur at first with a considerable interval between them; from a half hour to ten minutes in perhaps the majority of cases. The interval gradually diminishes until scarce a minute intervenes between contractions. The contractions themselves increase in power and length of continuance until the expulsion of the child.

Pain.—Very little pain attends the contractions unless disease of some sort has interfered with the proper action of the parts concerned. There should be no pain at all during the first stage. To use the words of John Power, "the accompanying sensations are referable to the os uteri, vaginal passage, or contiguous parts; they do not amount to pain, but consist of a forcing or bearing down."[1] Every physician will meet with not a few women who exemplify this fact.

Some women sleep through the process of dilatation, and awakening with a more forcible contraction find that the child is born before the doctor can be

[1] Treat. on Midwif., p. 132.

summoned. Some also have pain in the wrists or ankles during each uterine contraction, but none in the usual place. When the child's head reaches the vulva and puts its highly sensitive tissues upon the stretch, the pain of distention is necessarily present, especially in primiparæ. But even here, a cunning provision for anæsthesia is commonly brought into action. As the head begins to press upon the perineum, involuntary contractions of the abdominal muscles are provoked. The woman bears down vigorously, steadying herself by rigid contractions of the arm, chest, and neck muscles, compressing the veins in the neck and causing thereby a temporary congestion of the brain, as her reddened face and dull expression sufficiently attest. This has a decidedly anæsthetic effect and is an evident natural provision intended to do away with or mitigate pain, where it would otherwise be unavoidable.

It is not merely from analogy that we conclude that in ideally normal labor there is no pain or but little. Not only because all other functions of the body are painless or even pleasurable, but there are extant a sufficient number of healthy women to allow every practitioner to see occasionally an example in proof. Much harm has been done by regarding cases of painless labor as exceptions to the rule. So they are, indeed, considered numerically, but they ought rather to be regarded as models to which all other kinds of labor should be made to conform as nearly as possible. If a woman has a markedly painful labor, it is because personal or inherited violation of hygienic law has caused her to be afflicted with inflammatory or mechanical disabilities in the organs

of parturition, and not because it is natural for woman to suffer in childbirth.

Duration.—The duration of an ideal labor is an important point to be established, and upon this subject we find endless varieties of opinion. A physiological act ought not to require an exhausting effort; but not to use an *à priori* argument, we may appeal to the bedside. Apart from cases of rapid delivery, so called, where the woman is awakened from sleep by a pain, springs out of bed and drops the babe on the floor, there are not infrequently witnessed by every physician, cases where one, two, or three hours suffice for the whole process of labor from beginning to end. We may then rule out of court at once those who regard three or four days as a not extravagant duration. Text-books may be searched in vain for such extreme views, but in actual practice, women in every community are exposed to the services of those who think that any labor which ends in spontaneous delivery is natural, or, at least, not to be assisted. Opinion is not as valuable as fact—and in the oft-quoted statistics of Collins we have very reliable data for forming a correct judgment on this point. These statistics show that in nearly 17,000 cases of labor, 84 per cent. were delivered in six hours or less. One-quarter of these were primiparæ, in whom the process of stretching the vagina and perineum must require more time and effort than in multiparæ. Sixty per cent. of the whole number were delivered in four hours or less. These statistics may safely be taken as representative, having been gathered in the Dublin Hospital, and based upon the labors of

women as far removed from the influence of civilization as could be found so near at hand. If they err at all, it is in representing the duration of labor as greater than it should be, since many of the women were ill-fed and overworked, coming from the class which furnishes many cases of deformed pelves and difficult labors. Comparing these with personal observations, I am confident that we may take six hours as representing the maximum limit of normal labor—the truly ideal labor being an affair of but two or three hours at most. Allowances must be made for differences in temperament. Some are brisk and energetic in all their movements; others slow and lethargic in every function. There is a permanent difference between the duration of the second stage in the primipara and multipara. In the former an hour of good uterine contractions is not too much to allow for the gradual dilatation of the vagina and perineum. In the multipara two or three pains often suffice to expel the child when once the womb is opened enough to permit the passage of the child. When we find the first stage dragging wearily along for a day or so, we may be sure that the labor is not natural and that some morbid condition is present which prevents the natural order of events from being carried out. When the womb is fully dilated and the head does not make substantial advance with every contraction, it is because there is something interfering with the mechanism of delivery. The head is too large, the pelvis too small, or the contractions too feeble to do their appointed work. None of these conditions is natural, and the question of interference should not be con-

trasted with a leaving the woman to a supposed "nature." We interfere not with nature, but with an unnatural condition. To recapitulate, we may define a typically normal labor as follows:

1. The uterine contractions continue with increasing force and rapidity through a few hours.

2. They are attended with little pain.

3. When the os uteri has become fully dilated the membranes rupture and the liquor amnii escapes.

4. The child then descends promptly, and is born in from ten minutes to an hour; primiparæ requiring a longer time than multiparæ.

5. The third stage of labor, the delivery of the afterbirth, is more or less artificial, for reasons which will be given hereafter in their proper order.

6. The woman is not permanently injured by her labor, but is as well after as before, and in due time returns to her usual condition and health.

This is what ought to be and what is often witnessed, especially in country districts, or where the ravages of civilization upon female health and vigor are less extended. But, on the other hand, it must be admitted that the majority of women bring forth children in pain as well as sorrow, and that the process continues for many hours in perhaps more than half of all cases. That this is largely unnecessary, is equally true, and it is painful to admit, that notwithstanding the teachings and practice of the best obstetricians, and the near approach of obstetrics to a science, there is a widespread tendency to non-interference in labor. Any obstetrician with large consulting practice, will recall many cases in which women have been allowed to struggle for days be-

fore interference was attempted; the attendant laboring under the strong delusion that nature is all-sufficient, and that meddlesome midwifery is bad. It is true that a physician will sometimes refrain from using the forceps, for instance, because he is ignorant or timid, and will justify himself by an appeal to the powers of nature, but often enough the reluctance to interfere comes from bad logic with a substratum of unconscious superstition. A man who would not hesitate to attempt to repress inflammation in an orchitis rather than to allow it to end "naturally" in suppuration, will calmly allow a woman with areolar hyperplasia of the cervix to spend a day or two in dilating it by the uterine contractions, rather than "meddle" by rendering mechanical assistance. And why? Forsooth, because labor is a physiological process, which, however true, is entirely irrelevant as regards the treatment of a diseased cervix which is interfering with a natural function. As long as a labor is proceeding according to the normal standard, any interference is certainly meddlesome. A grave mistake is made by making "average case" a synonym for "normal standard."

The artificial life of the civilized woman has had a material influence upon her capacity for normal labor. Corsets, high heels, failure to take exercise in the open air, abuse of the sexual organs, have brought it to pass that a woman is rarely in labor without having some complication which may or may not be removed by obstetrical treatment.

There will be found many conditions not easily or not at all to be remedied at the moment. We must

sometimes be content to witness unavoidable delay, but it is also true that the average case can ordinarily be treated, so as greatly to diminish the pain, duration, and exhaustion of the labor.

Any rule for interference must of necessity leave much to the judgment, and is valuable or not according to the wisdom of its user. It is right to assist whenever the proposed assistance will give less inconvenience or do less injury to the mother and child than the delay incident to relying upon the natural efforts. There is present in a given labor a hindrance of some sort, which the uterine contractions will require several hours to overcome. The physician can dispose of it in ten minutes or less, without injury to the mother and child, and with little inconvenience. There can be no question as to his duty in such a case. And yet even the application of the forceps sometimes hangs upon the decision of such a question, to say nothing of puncturing the membranes, dilating the os uteri, and minor assistances. For any rule to be of service, the physician should be thoroughly acquainted with the proper action of the parts involved and the mechanism of labor; the effect of parturition upon the general system; the risks to which it exposes the woman and child, and the resources of our art. In any doubtful point it will be wiser to err upon the conservative side, and while frequent interference in labor does not necessarily imply rashness, it is also true that

"Fools rush in where angels fear to tread."

Our aim should be to conduct each case in as close a conformity to the ideal standard as is possible,

and to see that the woman is not injured by her labor, or that any unpreventable injuries are, as far as can be, repaired. The welfare of the child should also be our care, and will sometimes determine our course when the woman's condition may be comparatively satisfactory, as, for example, in prolapse of the funis.

CHAPTER II.

THE MANAGEMENT OF SIMPLE LABOR.

A PHYSICIAN when called to attend a woman in labor should go promptly, to ascertain as early as possible the presence or absence of complications. He should have always in readiness a few medicines and instruments, especially if the case is far from drug-store or office.

THE ARMAMENTARIUM.—A preparation of opium, preferably one-eighth grain powders or pellets of morphia sulphate, a solution of choral (gr. xv to ʒj), a vial of tincture of iodine, and one of sulphuric ether, are the only medicines likely to be needed. The ever-present pocket case containing needles and silk, a catheter, lancet, and scissors, he will have with him. A pair of obstetric forceps and a fountain syringe will complete the list in the way of instruments. Craniotomy forceps and other apparatus for extraordinary occasions can be sent for if required during the labor. Indeed none of these may be needed, but unless the physician already knows something of the circumstances of the case, he may save considerable time and trouble by having such an array of remedies ready to his hand.

PRECAUTIONS.—An obstetric call should be refused if the physician has within twenty-four hours made a post-mortem section, or is in attendance upon cases of the triple-faced Hecate, scarlatina, diphtheria, erysipelas. He should be clean all through—with especial care of the nails, which should be short,

not sharp-edged, and cleaned immediately before attendance upon the case. Circumstances may compel attendance in spite of these disabilities, in which case a bath, complete change of clothing, and free use of antiseptic solutions for the hands, will greatly lessen any risk of transporting disease.[1]

Previous Attendance.—Whenever it is possible, the physician should superintend the later months of pregnancy, being thereby often enabled to prepare the way for a successful termination. The urine should be tested for albumen and appropriate treatment resorted to if any renal disease exists. The bowels should be carefully looked after; the constipation so often accompanying pregnancy is apt to lead to fecal accumulations which do harm both during and after labor. Especially in primiparæ the nipples often need to be elongated and hardened to prepare them for usefulness; a process which cannot be done so well after lactation has once begun. This previous care is not always practicable, and we must sometimes attend cases where our acquaintance begins in the lying-in room.

History of the Case.—On taking charge of a case of labor, we both acquire useful information and accustom the woman to our presence by beginning with a series of questions, more or less routine in character. When did the pains begin? How far apart do they occur? The seat of pain and its severity, inquiring especially concerning headache. When last were the bowels moved and urine passed? We should also ascertain whether it is a first preg-

[1] *Vide* Journ. Am. Med. Asso., July 4, 1885, article on this subject, by Geo. F. French.

nancy; how many miscarriages, if any; and for the sake of completeness the age and nativity may also be noted. If the patient is a multipara, we should inquire concerning the nature and duration of her former labors. I attended a case once where the os was nearly dilated upon my arrival. In a few minutes more dilatation was complete, and the head descended promptly to the pelvic outlet. I therefore gave the woman assurance that she would speedily be delivered. After waiting for nearly an hour longer without any change in the situation, I bethought myself to ask concerning her two former labors, learning that in each the child had been extracted by the forceps after long delay. This led to a more careful investigation, when the inferior strait was found to be somewhat narrowed, and the forceps were required in this instance also. This with other cases which might be related, illustrates the advantage of finding out all we can of the previous history. If one is in the routine habit of asking every woman in labor whether she has headache, he will not often be taken unawares by cases of puerperal eclampsia, and may possibly prevent its occurrence. Other questions will suggest themselves in various cases, but it is well to have a regular system as a foundation. Some of the information gained, with a record of the subsequent proceedings, may be jotted down on the back of an envelope in default of a better depository, and when the opportunity offers may be transferred to a register, which every one attending labors should keep. It is astonishing how small an amount of note-taking serves so to embalm the case that it can be recalled in all of its details

years after by an inspection of the register. In this way experience will not evaporate, but remain to assist the practitioner in becoming more serviceable as the years go by. Otherwise he is likely to become an old fogy, having "impressions" of this and that, but remembering nothing accurately. The following form will be found useful, and a sheet of foolscap will accommodate twenty-five or thirty names.

Number.	Name	Age	Nativity.	No. of pregnancy.	No. of abortions.	Duration of stages. 1 h. m.	2 h. m.	3 h. m.	Interference. Cause.	Interference. Kind.	Child. Male or female.	Child. Weight.	Child. Presentation.	Child. Position.	Hour of birth. A. M.	Hour of birth. P. M.	Remarks.
1	Mrs. B. D.	29	U. S.	2	0	9	...	...	...	None	F	8 lbs.	V	1		9 15	
2	Mrs. A. J.	30	Eng	1	0	6	15	3	Narrow outlet.	Forceps.	M	9 lbs	V	1	4.30		Coccygeal joint rigid.
3								6	...	15							
4								15	...	20							
5																	
6																	
7																	
8																	
9																	

Lest this register should not explain itself, it may be amplified as follows: Mrs. B. D., æt. 29, nativity American, second labor, and has had no miscarriages. The first stage lasted for nine hours, the second fifteen minutes, and the third six minutes. The progress of the case having been quite satisfactory after the doctor arrived, no interference (except routine) was required. The child was a female, weighing eight pounds; it presented by the vertex and in the first position, and was born at 9.15 A. M.

The First Examination.—By the time we have finished our inquiries there will usually occur a pain, during which we may most conveniently make our first vaginal examination. Partly because it is desirable to notice the condition of the os uteri, etc., during a contraction as well as during the interval, and partly because it is less formidable for the woman if begun while her attention is taken up with the pain. It is not necessary to wait for a contraction before making an examination, although it is preferable. Occasionally, and less often now than formerly, the presence of the physician causes such mental perturbation as to put a stop to the contractions for some time. The increasing prevalence of men-midwives and the freer association of the sexes in modern civilization, have made more scarce the kind of woman who is abashed by the presence of man. The sooner the examination is made, the sooner we shall know what is going on.

Points to be Observed.—The things to be noticed in the first examination of the case are:

1. Does pregnancy exist?
2. Is she in labor?

3. The position and condition of the os uteri.

4. The state of the membranes and of the liquor amnii.

5. The presentation and position of the child, and

6. The condition of the maternal tissues in general, including the size of the pelvis.

If we are really to take care of and minister to the patient, we need to know all these points. If we are going to wait upon Nature, whatever happens, it is scarcely worth while to make any examination at all.

1. *Diagnosis of Pregnancy.*—Spurious labors and extrauterine gestations are not so rare but that every physician may see one or more during his pilgrimage. It is therefore well enough to notice, first of all, whether there is a uterine tumor, a cervix altered by pregnancy, and a child presenting at the os uteri.

2. *Diagnosis of Labor.*—The existence of labor is usually determined by four points: the disappearance of the cervix, the open and dilating character of the os uteri, a discharge of mucus tinged with blood (called by the old women a "show," and regarded as a sure sign), and the presence of regular uterine contractions. In premature labor the cervix may not be effaced, but its canal becomes widely patulous. At full term a primipara is surely in labor if one can introduce the index finger into the os uteri; but in some multiparæ one, two, or even three fingers can be introduced as far as the os internum at any time during the last month of pregnancy, and sometimes even the os internum becomes dilated in like manner. A decided increase in the discharge of mucus

betokens activity of the uterine circulation, and when stained with blood the evidence is quite strong that the os uteri is dilating and breaking down capillaries in its structure. If this coexists with uterine contractions, as determined by the hand laid on the woman's abdomen, we may be sure that labor has begun.

3. *The Os Uteri.*—Most important of all is to determine the exact condition of the os uteri—its position, whether in front or behind, central or oblique; its size and consistence; what its diameter is, at rest and during a contraction; whether its edges are thin or thick, soft and yielding, or hard and cartilaginous, dry or moist. The two fingers introduced within its rim and spread out may enable us to judge of its dilatability, or whether it is tense with spasmodic contraction of its fibres. Grievous mistakes have been made for want of correct observation of the position of the os. In some cases it is tilted backwards, so near to the promontory as to be almost inaccessible. The anterior lip becomes greatly stretched in such a case, and should the incautious physician judge solely from the thinness of the structures under his finger, he might mistake the thinned uterine wall for the membranes, with disastrous result.

4. *The Bag of Waters.*—The condition of the membranes is also to be observed, as to whether they are unbroken; whether a bag of water has formed in advance of the head, or whether they are stretched over it without any intervening liquor amnii. In the latter case they may escape detection, but should be recognized by their smooth surface as distin-

guished from the hairy scalp. During a pain the membranes become tense, and if there is any liquor amnii in advance of the head, they are made to bulge through the os. We cannot, therefore, judge accurately concerning the membranes unless the examination is made during a contraction as well as in the interval. Care must be taken not to press firmly against them, lest they should be prematurely ruptured.

5. *The presentation* of the child should, of course, be determined as soon as possible; that, in case it is either the transverse or facial, we may rectify it early in the labor. But, as to the exact position of a vertex presentation, it is held by some that we may remain in ignorance. As a matter of fact, we are sometimes unable to ascertain the position without introducing the whole hand into the uterus, a step not to be taken lightly. The presence of a caput succedaneum, or the unusual character of the sutures and fontanelles, may make diagnosis difficult. But no sophistry should blind us to the fact that we should always *endeavor* to ascertain the position, and by constant practice we may become more expert. In case of any instrumental interference, an exact diagnosis is peremptorily necessary. This much may be conceded: that we need not always insist on knowing the position during the first examination. In primiparæ especially the parts are sometimes so sensitive, early in the labor, that if we protract our investigation long enough to trace out the sutures with certainty, we shall both give the woman much pain, and inspire her with needless dread of subsequent examinations. If we wait a little while, the sensi-

tiveness will be much lessened, and the pressure necessary to explore the fœtal head thoroughly can be made with little discomfort. Each position of the vertex has its appropriate mechanism. We can neither appreciate what is going on, nor intelligently render assistance, should any be needed, if we do not know exactly how the child is situated in the pelvis. While the importance of this knowledge varies greatly in different cases, those who accustom themselves to refrain from making a diagnosis will find themselves inexpert when diagnosis becomes a vital matter.

6. *The Condition of the Passage.*—During the examination, the condition of the vagina and pelvic canal should be noted. Is the vagina roomy, relaxed, and moist, or narrow, rigid, and dry? Slight pelvic deformity cannot be discovered by a casual inspection, but any notable degree can be detected as the finger is carried about the passage. The free secretion of mucus from the cervical glands and vaginal crypts is desirable, and its absence is usually associated with rigidity of the cervical and perineal tissues. Attention to this point may help us greatly in successfully treating the case. We should also note carefully the character of the pains, the size and position of the uterus, and, being in possession of all these data, we know what is to be done, and are prepared to conduct the case to a happy termination.

Prognosis.—As soon as we have finished our first examination, we should at once relieve the woman's mind by assuring her that she is all right, and that there is no danger to be feared. Where a malpo-

sition or other complication increases the risk to the child, it is well enough to inform the nurse, or some one of the family, of such fact. But we may safely proclaim immunity to the mother, if the case is properly conducted, in all cases, except a very few, such as grave pelvic deformity, placenta prævia, and the like. The assurance of safety, made confidently, has often an excellent effect, freeing the woman from apprehension, and even improving the uterine contractions. Much more caution must be exercised in answering the question very apt to be asked at this time, "How soon will she be over with it?" The prognosis of the time of delivery is based upon very variable factors. Generally speaking, we may say that if, in so many hours, the os uteri has become half dilated, or with a diameter of about two inches, it will finish its dilatation in about half as many hours more, the rate of dilatation always accelerating with its extent. We may then allow an hour or more for the second stage in primiparæ, and a quarter or half hour in a multipara. But, unless attendance in previous labors has made us acquainted with the parts involved, we may greatly err as to the amount of resistance to be overcome during the dilatation of the os, or the subsequent advance of the child. A woman who has had a rapid labor with a six-pound child, may have to be delivered by instruments with a nine-pound child. The rhythm and force of the uterine contractions are also apt to change in any case. If we are reckoning upon rather feeble contractions, a sudden increase of uterine energy may end the labor speedily, and good contractions may be suspended or enfeebled from a

variety of causes. It is, therefore, better to be oracular and indefinite upon this point; and yet, allowing for occasional surprises, experience will confer expertness upon the observant in this as in all other matters.

THE PHYSICIAN'S DUTIES.—If all goes on well, no active interference will be required during the first stage. The physician should superintend the dress, bed, posture, and general conduct of the woman; and, what is often of great importance, should see that nothing is done by others to complicate the case. The lying-in room is regarded as their special province by the "old women," who, in the dawn of civilization, were the only assistants available, and who seem to relinquish their prerogatives with regret. On such occasions, in popular neighborhoods of the poorer classes, they delight to collect in gangs to comfort and advise the woman with accounts of all the bad cases occurring in their united experience. I have seen over twenty in a single room, which is too many for good ventilation, to say the least. It is no small part of the physician's duty at times to guard his patient from such meddlers, and to take absolute control of the lying-in room. All of which may be accomplished with little offence, if done with tact and dignity.

Dress.—The preparation of the woman's apparel and bedding may be left to the monthly nurse, if that functionary is present and duly qualified; but in a general way it may be stated that the less that is left to unprofessional hands, the better. During the first part of the labor, the woman may be up and about, loosely dressed with her usual clothing; but

when she takes to the bed, she should wear a light underskirt or chemise and a night-dress. These garments should be well tucked above the hips, and securely pinned. In this way they escape soiling by the discharges, and, after the labor is over, there will be no immediate need of changing her apparel. Those who practise among our foreign population will find many curious customs as to dress and other matters, which may be humored if harmless. The physician should also see that the clothes, etc., are prepared for the child. During the second stage it will encourage the woman to have these preparations made, as if in confident expectation of a speedy arrival.

The bed should be prepared by placing a square of rubber-cloth upon the under sheet, over which an old "comfort" may be spread, and upon this in turn a folded sheet, which may receive the discharges, and be renewed from time to time, if necessary. The bed-covering should be regulated by the weather and the sensations of the patient. During the active part of the labor, a single sheet will be sufficient covering if the room is of a comfortable temperature. As, in spite of all precautions, the sheets and other coverings may become wet with liquor amnii and blood, it is always well to have some extra sheets airing and in readiness. Much discomfort is often occasioned the woman by her lying upon damp bedding, nor is it compatible with the best health.

Posture.—Some women want to walk about as long as possible, others at once take to bed. Beyond the temporary lying down for the first examination, the convenience of the patient may be con-

sulted up to a certain point. But when the os uteri has attained a diameter of two inches, she should be required to stay in bed. No particular posture need be insisted on as necessary to be continuously maintained. The recumbent posture, in spite of some theoretical defects, is the one most convenient and comfortable. When an examination is made, or any operative procedure undertaken, the woman must lie upon her back, for in this position the relations of the various parts to one another can be more readily determined. But, should the woman be restless, and desire frequently to change her position, there is usually no valid objection. An exception must be made of allowing her to get out of bed. As the head descends, and presses upon the lower bowel, most primiparæ suppose that they have a "call of nature," and desire to sit upon the chamber, which, of course, must not be allowed, lest the child should suddenly be born in that contracted space. A change of posture from the back to the side, or the reverse, is often useful. The pelvic articulations are slightly movable during labor, and the muscular action incident to a change of position sometimes breaks up a wedging of the head at some point in the pelvic canal, and perceptibly expedites the delivery. A newly arrived emigrant will sometimes insist on being delivered in the kneeling posture, which has some advantages, and should by no means be refused her.

General Hygiene.—Labor does not or should not continue long enough to require any regulation of the woman's diet. There is no reason why she should not eat if she desires to. Thirst is not un-

common, and may be relieved by cold water, milk, tea, or almost anything she fancies. A glass of hot toddy is often given to increase the strength of the pains, which it may do briefly, but only to leave them weaker than before. Neither alcoholic beverages nor the teas suggested by outsiders should be given without good reason. The ventilation of the room should be attended to, unnecessary spectators removed, and a general atmosphere of cheerfulness encouraged.

Examinations through the vagina should not be made too frequently, but it is difficult to frame any rule upon the subject. As a general thing, we may note the progress of the case with sufficient closeness if we examine every half hour during the first stage. Much depends on the activity of the uterine contractions. The great objection to frequent examination is that the finger is apt to withdraw each time some of the lubricating mucus from the vagina. This can be largely remedied by having the finger or fingers liberally anointed with vaseline, lard, or other unguent. Soap and water is sometimes the only attainable substance, which is to be avoided if possible, since there is a double reason for having the finger lubricated; not only that it may readily be entered and withdrawn, but also to guard against mutual infection, either of the woman by a possible hang-nail harboring contagion, or of the physician by her secretions. There is a great difference in women as to their demands upon the physician. Some object to being touched, and others seem to think that it is his duty to be engaged in some manipulation or other continuously. Usually after

the second examination the physician may estimate quite closely the rate and duration of the labor and thus determine the necessity for further examinations at short or long intervals.

Presence of the Physician.—Since a general superintendence is all that is needed during the first stage of labor if normal, or nearly so, it will not always be necessary for the physician to stay in the room or house continually. He may even visit other patients, returning in an hour or half hour, it being rarely wise to exceed this limit. If the progress of the case is so rapid as to induce him to stay, he should occasionally absent himself from the room, that the woman may make water unembarrassed by his presence, and for similar reasons. When a labor is slow and interference not demanded, he may employ himself usefully by taking a nap in an adjoining room.

Rupture of the Membranes.—When the os has become fully dilated, the head being in a proper position and ready to descend, the bag of waters has survived its usefulness, and should be punctured without delay, or waiting for the pains to accomplish it. This is the first decided interference which is called for; and, although a trifling operation, is far from unimportant in its results. In an ideal labor the membranes should be torn as soon as the os is open enough to admit of the escape of the head, and this is sometimes clinically witnessed. Still more often we may see cases where the membranes are unusually tough, and where hour after hour of pains is wasted in a vain effort on the part of the uterus to tear them. Sometimes the mem-

branes stretch indefinitely without tearing, and may after some hours be made to reach even to the vulva. In such cases as these, hours of effort and suffering may be saved by the artificial rupture of the membranes. And since the presence of a bag of waters cannot be of any service after the os is fully dilated, it is a plain routine duty to rupture it in any case when that stage has been reached. Rupture of the membranes before full dilatation is usually disastrous, but may be performed as a remedial measure in some cases of uterine inertia. The membranes can usually be broken by simply pressing the finger against them while they are made tense by a uterine contraction. When this is not enough, a sharp in-

FIG. 1.

The nail of the middle finger prepared for puncturing the membranes.

strument can be improvised by making a longitudinal incision in the middle of the free border of the finger-nail, and then removing the nail on one side (Fig. 1). It is well to allow the nail of the middle finger to grow longer than its fellows for this purpose. This gives a knife-edge which can be made to cut through membranes of almost any

thickness. Before the puncture is made, a cloth should be placed before the vulva, especially if there is much liquor amnii, in order to prevent it from wetting the bed-clothing more than can be helped. It is also well to inform the patient of what is going on, lest she be alarmed by a sudden gush of fluid.

Before the escape of the liquor amnii every uterine contraction forced the fluid contents of the womb in advance, thus forming a soft dilating water cushion. At the same time the head was floated back from the os uteri, dropping back into place usually after the contraction was over. As soon as the fluid is removed from the womb, the head is propelled forward with each contraction, and should be pushed through its short journey in a short time. We may frequently see multiparæ in whom a single contraction after the os is fully open and the membranes ruptured, sends the head to the perineum, and another contraction expels it altogether. But always in primiparæ, and sometimes in multiparæ, there is a tighter fit between the head and pelvis than will admit of such rapid transit. The head must then be compressed and moulded into a form sufficiently small to offer less resistance. A woman may be of typically healthy build, and yet have a long labor, because the child's head is rather large for her pelvis. The intermarriage of those from different races or strains of blood, often brings this about. The great variability in the relative size of the head and pelvis makes it difficult to draw a line and to say that all on this side is natural labor, on the other side unnatural, and in need of assistance. If, however, we hold fast to our conception of ideal

labor, we can be in little doubt as to our practical duty in any specific case. As soon as the womb is fully open the head should be propelled on and out, and quickly enough to avoid subjecting the mother to much fatigue or discomfort. It is, therefore, the estimation of the fatigue and discomfort, and not the number of hours in labor, which should determine us to interfere or to refrain. So far as the first stage is concerned, we may often be content to let well enough alone. In the second stage, whenever the mother is tired, we have it absolutely in our power to deliver her safely with the forceps. Armed with this precious knowledge, the physician may watch the progress of the second stage with equanimity, having the matter entirely in his own control.

CHAPTER III.

THE MANAGEMENT OF SIMPLE LABOR—CONTINUED.

Flexion.—Under ordinary circumstances no further assistance beyond encouraging the woman is needed until the perineal stage. There are two slight manœuvres which may occasionally save some time: First, it is a well-known fact in the mechanism of labor that the more the head is flexed the smaller the outline it presents to the pelvic passage. Owing to a slight misdirection of the uterine force or to other causes, the head sometimes fails to be flexed as promptly as it should, and in this way labor is delayed. By placing the finger on the posterior fontanelle one can, by appropriate pressure, materially assist in the flexion of the head, especially when the parietal bones overlap the occipital so as to give a good hold. I have often seen such action promptly followed by the advance of a hitherto stationary head. This applies more particularly to the occipito-anterior positions, these alone being found in strictly normal labor.

Retraction of Anterior Lip.—Secondly, we may sometimes notice, even after complete dilatation of the os uteri and when the head has descended somewhat in the pelvis, that the anterior lip of the cervix still stretches tightly over the occipital segment of the head. This directly retards its advance as well as tending to prevent flexion. This is to

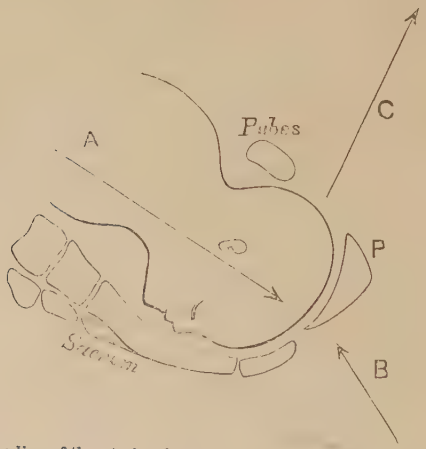
be found when the head has in part passed through the os uteri, and the cervical margin can be detected only in front. Under these circumstances we may considerably expedite matters by placing two finger-tips under the margin of the anterior lip, and during a contraction pushing it up and over the occiput. Dr. Berry Hart has shown that in labor, all in front of the pelvic axis tends to be pulled upwards in labor; all behind to be pushed down; the anterior and posterior lips of the uterus acting in this respect like sliding doors. If the head is wedged in front so as to nip the anterior lip and prevent it from being retracted over it, we are but doing what Nature should have done but did not when we push up the anterior lip; we imitate the natural mechanism, as when we rupture the membranes, flex the head, and as in almost all judicious interference. If the pushing up the anterior lip be done indiscriminately and rudely, it will no doubt occasionally result in laceration of the cervix, but when the conditions are as above stated there is more risk of laceration in allowing the head to reverse the natural mechanism and drag down the anterior lip, than from our efforts to prevent it. It should be done gently and with care, and in suitable cases, when it will be found to be of signal service. It is sometimes necessary to push the lip up before the contraction begins, holding it in place until the head is pushed down.

The Care of the Perineum.—As the head nears the vulva and begins to press upon the perineum, the physician should take his seat at the bedside, and watch the further progress narrowly, if necessary keeping a finger on the perineum in order to observe

the degree and rapidity of its distention. His principal aim at this time is to preserve the integrity of the perineum, to which end he should be well grounded in the knowledge of the proper mechanism of this stage.

The perineum is placed directly in front of the pelvic outlet, stopping up that opening under ordinary circumstances. The uterine force in sending the head centrally through the pelvic outlet brings it directly against the perineum, and, so far as the uterine force itself is concerned, tends to push the head directly through the perineum (Fig. 2, P). But

FIG. 2.



A. The line of the uterine force.
B The line of the perineal force.
C. The resultant of the two forces in which the head should move.

the perineum is elastic and resists this force by virtue of its elasticity, pushing the head back against the uterine force. And not exactly back in the same line of direction, else there would be no way for the head to be born; but in a direction somewhat in

front of the line of the uterine force (Fig. 2, B). Therefore, the head acted upon by these opposing forces, moves in the resultant of the forces, a line midway between them, and thus the head is made to glide over the perineum instead of through it.

A second and distinct property of the perineum is dilatability. It is necessary for it to stretch considerably before a sufficient space is provided to admit of the passage of the child's head. This is accomplished partly by the uterine force, and is partly an active process of dilatation, like the opening of the sphincter ani or the movement of the iris. This self-dilatation is greatly promoted by a free discharge of mucus, such as is normally present.

The distinction must be carefully noted, between the resisting force-supplying property of the perineum and its capacity for stretching without giving way; in other words, between its elasticity and its mobility, or, rather, cohesive properties. Thus it may happen in a given case that a perineum is capable of being stretched to an extent freely permitting the passage of a large head, and yet has so slight a power of elastic resistance that it does not repel the head, and, therefore, does not furnish the secondary force needed for its further advance and delivery. It stretches, but only stretches; and the mere stretching of the perineum cannot advance the head in the proper direction, since the uterine force cannot act around a corner, unless there is something to deflect it. In such a case the uterus drives the head against the perineum, which readily yields until the vulvar outlet is amply dilated so as to allow the head to pass; but there being no elastic

resistance to oppose it, the uterine force continues to impel the head in the only direction in which it is capable of acting until even the stretching power of the perineum is worn out and its substance is torn. What is needed in such a case is not a more *distensible* perineum, for distention has been generously provided for; but the artificial replacement of the missing secondary force which should serve to change the direction of the uterine force and propel the head over instead of through the perineum. It is also evident that there must be a due proportion between the strength of the uterine force and of the secondary deflecting force of the perineum. If the uterine force is relatively too powerful, or the elasticity of the perineum too slight, too little resistance will be offered to the passage of the head, and the powerful disrupting uterine force will overcome and tear the perineum. It was because of this fact that the old method of perineal support was devised. When the uterus pushed the head down, the obstetrician was directed to push it back by the hand placed directly upon the perineum, or with a napkin beneath it. The intent was principally to strengthen the perineum, the napkin and hand officiating as extra layers of tissue. To a certain extent it is still proper to resist a powerful uterine contraction, and we should by no means allow the head to be expelled at such a time. A better control, however, can be had of the head, by the method of rectal manipulation. Two fingers introduced into the rectum may be pressed against the child's forehead, malar bones, or chin, as is most convenient. The thumb is placed upon the protruding occiput, and

in this way we may flex or extend the head if desirable, or prevent its advance during a contraction. But better than this, we can, as Ould and Smellie taught, press out the head at our pleasure. Thus, when the head is distending the perineum so that at the end of a pain the head is not retracted, but remains at its furthest point of advance, hugged against the subpubic arch, and making the perineum bulge considerably, the head may usually be pressed at once through the vulva by the fingers in the rectum, without any fear of lacerating the perineum. And why? Because the uterine force is not driving the head against the perineum, but the fingers alone propel it in exactly the right direction, so that the perineum *is only called upon to stretch and not to resist* the driving uterine force in addition. The philosophy of this manœuvre is at the bottom of any possible method of real prevention of perineal laceration, viz., to bring the head over the perineum during the absence of any uterine contraction or any expulsive effort of the mother. For it is the uterus which ruptures the perineum much oftener than the size of the head; a result often due to the conjoined impatience of the mother and physician. The one is in a hurry to be delivered, the other is tired and anxious to escape from an irksome attendance; and while the woman bears down vigorously, the physician does not discourage her efforts, but at most vainly attempts to resist the tremendous uterine force with the pressure of the hand. It will be noted that this method requires for its success certain factors which are not always attainable. Uterine contractions are sometimes provoked by this

manipulation, and there are some women who will bear down in spite of all the representations we may make. But when these difficulties can be overcome we have a sure method of preventing laceration in all cases where there is no organic defect in its structure. When there seems to be unusual risk of laceration, as in young primiparæ, it is well not to conduct this manipulation under the bed-clothes. The woman should be placed in the position for the application of the forceps, and the eye should assist in determining the critical moment when the head is to be pressed out. If the woman cannot refrain from bearing down, she may cry out and keep the mouth open, which will lessen the force of the expulsive effort. Another method much used, is one which is mainly useful in preventing the full effect of the powerful uterine contractions, and also in keeping the head well flexed; that is, in relation with the genital canal, and not absolutely or in relation to the child's body, for the head passes over the perineum by a movement of extension. In this method the thumb is placed upon one side of the vulva, the fingers on the other side, the palm embracing the distended perineum with the volar surface upwards. The other hand makes pressure upon the occiput in front, and in this way we may both retard the passage of the head and keep the cervico-bregmatic diameter in direct relation with the successive planes of the canal. We may also occasionally press the ball of the thumb upon one of the nates, while the fingers reaching across pull the skin of the opposite buttock towards the median line. In this way we may crowd skin and cellular

tissue into the perineal space, and thus afford a more distensible surface. We do not in this way increase the size of the real perineal structure, but by increasing the thickness of the cutaneous covering we may add a little strength to the outer layer. But whatever method we may adopt, the principle of extricating the head when the uterus is not contracting is most valuable. As regards the propriety of keeping the head back for a long time in order to secure full dilatation of the perineum, it is probable that the teachings of the last generation were mainly unnecessary. It was once regarded as the physician's duty to prevent the escape of the head for hours in many instances. It would certainly seem that when the fingers can press the head out without any help from the uterus, that the perineum is sufficiently dilatable, and there can be no better rule than this. As a matter of fact, when once the head begins to press upon and stretch the perineum, the tonicity of the perineum is directly impaired by every degree of continuance of the labor. The longer the time taken to distend it, the more its circulation is impeded and its powers of cohesion diminished. I have seen cases where the head had been allowed to remain upon the perineum for many hours, until all tone and elasticity had been lost, and the perineum could not be made to dilate without tearing like wet paper. On the other hand, such cases as this can be often met with. A young primipara had been long in labor, and the head was beginning to press a little upon the perineum. The vulvar opening was so small that there was scarcely room for the introduction of the second blade of the

forceps. The head was made to distend the perineum fairly as soon as the instrument was applied, and was then allowed to retract. This was repeated four or five times, at intervals of a minute or so, when a large head was withdrawn over an entirely unscathed perineum. The forceps in skilful hands give such complete control over the movements of the head, as to enable us to prevent laceration with more certainty than when only the fingers are used. But in unskilful hands they will promote the accident. Whatever method be employed, the physician should aim earnestly to have as few and as slight lacerations of the perineum as possible. He should not let his efforts slacken because of the undoubted fact that the perineum will sometimes be torn in spite of all efforts. On the other hand, he should with greater care observe the effects of his manipulations, working in the hope that in the future we may be complete conquerors over this accident.

Funis around Neck.—Whether through the perineum or over it, the head is sooner or later born, and the active services of the physician should continue. He should at once take the child's head in his left hand and hold it up towards the pubes. The finger of the other hand should then be inserted into the vulvar fissure from behind, and a rapid search made for the funis, which is quite frequently found coiled or looped around the child's neck. Sometimes three or four coils are found, and should they be allowed to remain, they are likely to give trouble both by shortening the cord so as to make it difficult to extract the child, and because of the pressure to which they are subjected, the

child is in danger of being asphyxiated. If any coils are found, they can usually be slipped over the child's head, though sometimes it is necessary to cut the cord with scissors before the child can be delivered.

Extraction of the Body.—This matter being disposed of, the finger is next sent in search of the posterior shoulder—that is, the shoulder placed posteriorly in the vagina. When found, the finger may be hooked into the axilla, and traction being made, the rest of the child is delivered. If we wait for uterine contractions to expel the body, we may have to wait a long time, and meanwhile the child is in a position of some peril. Also, if both shoulders are delivered simultaneously, a larger bulk will be presented than if one shoulder is brought out in advance of the other; so that the latter event is both less difficult and less likely to cause a laceration of the perineum. But let the physician be very careful in what direction he pulls, since the sharp shoulder is responsible for more lacerations of the perineum than is the head. When the woman is in the recumbent posture the head emerges from the vulva directly upwards, or with a trend towards the mother's abdomen. This is to be carefully imitated in artificial extraction. At first the shoulder may be pulled downwards or horizontally, but when it comes to distending the perineum and pulling it through the vulva, one must pull upwards. It is well to guard the perineum with the other hand, and to see that the sharp angle of the shoulder glides out a little to one side of the median line if

possible; in which case it will be less apt to plow through the perineum.

Attentions to the Child.—The child having been born should be laid down in the bed, between the mother's thighs, taking care that its head does not lie in the pool of liquor amnii which is sometimes found there. The physician should then wipe his hands dry upon a towel, and lay a hand upon the mother's abdomen, in order to observe whether good uterine contractions exist, and if not, to rub, knead, and press upon the uterus until it firmly contracts. He should then insert a finger into the child's mouth and sweep it around to clear out any vaginal mucus which may have entered during delivery. If the child does not cry at once, a little spanking on the buttocks usually has the desired effect. If not, more elaborate means may be required for its resuscitation.

Tying the Cord.—As soon as the child cries we should proceed to sever its connection with the placenta. When a child is weakly, under-sized, or premature, it may be worth while to wait until the pulsations in the cord have ceased before tying it. Budin and others have shown that by waiting for the cessation of the circulation in the cord the child gains a few grammes in weight. But the average child is in no need of such increase, and we may usually go ahead at once after respiration is established. The umbilical cord should be tied in two places: first, two or three finger-breadths from the child's umbilicus; and, second, a few inches further on towards the placenta. The first ligature is applied to prevent hemorrhage from the child; the

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second, to retain blood in the placenta, and by thus preventing it from becoming limp and flaccid, assisting in its detachment from the uterine wall.

The material for the ligature is not important. Any twine or thread that is clean and will compress the cord sufficiently will do. We then cut between the ligatures with a pair of scissors. On no account should this be done under the bed-clothes, as it is necessary to see what we are doing.

The child should then be given to the nurse or other attendant. Since a new-born babe is rather slippery it is better not to hand it directly to any one, but it should first be placed upon a blanket, shawl, or the like, spread upon the bed, covered with which it can be more securely grasped and laid in a place of safety.

Delivery of the Placenta.—The physician is then ready to turn to the mother and complete the third stage of labor. There has been from time to time great opposition manifested to interference with this stage. Nature is surely competent to perform so necessary a part of the labor as expelling the afterbirth. Nature ought to be competent, and in some cases is, but it has been abundantly proven, first, that when all cases are abandoned to Nature a large proportion die before the placenta is expelled; and second, that until it has been expelled the woman is in great danger of hemorrhage, inflammations, and septic infection, from which she may die even after the placenta has been tardily cast out. Mankind have in all times devised methods for rendering assistance in the third stage, and now, thanks to Credè, we have a sure means of delivery,

which consists really in promoting and assisting the natural method, or in seeing that nature does her duty.

As soon as the child has been disposed of, the physician should place a hand upon the mother's abdomen, and gently rub it in the hypogastric region, with a view to excite thorough uterine contraction. If simple rubbing is insufficient, kneading with firm pressure may be added. Presently the womb will contract vigorously, and in so doing will rise upwards and forwards in the abdomen. With one or both hands the womb may then be grasped through the abdominal walls almost as if it were out of the body. Having grasped it, we should squeeze it with a view to shooting out the placenta much as a cherry-stone may be shot from between the finger and thumb. But while the thumb or fingers on the front aspect of the womb should be made to slide upwards while pressing, the fingers behind the womb should press with a downward motion. In this way we imitate the natural movement of the womb. If the manœuvre succeeds we can distinctly feel the placenta gliding out, and then by a little downward pressure we may cause it to be completely expelled from the vulva. The placenta should then be seized and rotated, so as to bring out the membranes twisted like a rope. In this way we run less risk of leaving any strips of membrane behind. This is substantially the famous method of Credè, which enables us to deliver in almost every case promptly, surely, and without introducing so much as a finger into the genital passage. Even moderate adhesions of the placenta may be broken up in this way. But

to be successful it must be followed implicitly and with understanding.

It is the womb which is made to do the work. The preliminary massage of the womb is just as important as the squeezing movement. In fact, most of the failures to use this valuable method may be attributed to attempts to express the placenta before the womb has been made to contract thoroughly. It is only when the womb has become erect, so to speak, through a vigorous contraction that we can grasp it effectively. We may not succeed in developing a satisfactory contraction for some time. If we find we are not likely to succeed in our first effort, we may desist from any manipulation for a few minutes and then return to the trial. It will rarely require longer than fifteen minutes, and in the majority of cases the placenta may be delivered in less than five minutes after the birth of the child. It is not necessary to be precipitate, but the early delivery of the afterbirth greatly relieves the mother of apprehension and removes several sources of danger. The only argument against it is the usual statement that it is an apparent interference with Nature. If the woman were left to herself, the process would probably be slower, and might not occur at all. Besides the advantages of prompt and clean delivery of the placenta the method of Credè has others not less important. The manipulation of the womb insures its thorough and continuous contraction, and few, if any, cases of post-partum hemorrhage have ever been witnessed after delivery by this plan in any uncomplicated case. Also, the blood is thoroughly expelled from the uterine

sinuses, and owing to this fact, puerperal disease of any kind is rare after this method is employed. It has two slight disadvantages. The abdomen is sometimes quite sensitive after labor, and the manipulation may be painful. This cannot always be avoided, but as one becomes more familiar with the method and more expert he will hear less complaint of its painfulness. The other drawback is the risk of leaving a strip of membranes attached to the womb, which can also be obviated by extra care in twisting the membranes during their withdrawal.

Our only alternative is to drag the placenta out by traction upon the funis, or to introduce the hand into the vagina or uterus. Pulling upon the cord distorts the natural method of exit. The placenta, instead of being folded longitudinally and slid out edgewise, is brought down like an inverted umbrella, presenting its largest bulk to the pelvic passage, which, in case of a large placenta, may make the delivery quite difficult. There is danger also of inverting the uterus; nor is this method always efficient. It is often accompanied by a diagnosis of adherent placenta, whereupon the hand is introduced to insure its removal. Even respectable savages do not pull upon the cord. Says Engelmann: "Primitive people, odd as it may seem, rarely pull upon the cord, but in most instances use the *vis a tergo*, stimulate the activity of the womb by friction of the fundus, and press out the contents." We should, therefore, endeavor to Credè[1] the pla-

[1] There is no reason why we should not use the verb *to Credè* as simpler than the periphrasis "to use the method of Credè." It would be a "monument more lasting than brass" to him who

centa, and if we fail through inexpertness or other cause, we may fall back upon its extraction by less desirable methods. (In very corpulent women it may be difficult to grasp the uterus.) When the placenta has been expelled it should be placed in a basin, or any clean vessel, and carefully examined, to make sure that no fragments remain behind. Those who adopt this inspection as a part of the regular routine will have no reason to regret it.

Repair of Damage.—The next thing in order is to repair damages, or at least to examine for them, since in the most apparently normal labor we may have extensive lacerations. It is not necessary and doubtfully proper to introduce the finger in search of a laceration of the cervix, since it is rarely feasible to repair it at this time, and we gain little by the simple knowledge of its presence. If extensive hemorrhage in spite of a well-contracted womb warns us that the cervix is torn, we may have to interfere, but scarcely as a matter of routine. The perineum, however, should always be inspected, and any laceration unless trifling should be repaired at once. First, because it diminishes the risk of septicæmia; second, because it can be more conveniently and painlessly done than at a later date; third, because it is more likely to be successful than the secondary operation. The latter is for the patient a somewhat formidable and expensive procedure, and in this case the proverb holds good that "a stitch in time saves nine"—for to repair the laceration at

systematized and insisted upon the method until he was heard. We speak of Burking a man, so that there is a precedent for so convenient a term as Credè-ing the placenta.

once is a slight and simple matter. The tissues have temporarily lost much of their sensibility and a few sutures may be applied with very little discomfort to the patient. We ought to leave the patient in as good a condition as we found her if possible, and it is slovenly practice to leave the woman with her knees tied together, in the hopes that Nature will do the correct thing. Extensive lacerations sometimes heal spontaneously, and unhealed lacerations do not always inconvenience their possessors. But should harm follow from our neglect we cannot escape the accusing voice of conscience, that we have not done our whole duty in the case.

The woman should be placed on her left side and a good light secured. For the average laceration of about an inch in length, two or three sutures applied deeply will commonly suffice to effect a cure. The sutures should be placed a half inch or more from the tear on either side, so as to take a good hold, and should be carried deeply so as to embrace as much tissue as possible. Failure is due as often as not to the sutures being too superficial. They must go deeply enough to prevent the transverse muscles from pulling the edges apart. Alloway[1] advocates using a single suture applied as close to the beginning of the tear as possible. The upper suture is certainly in most cases the most important one. I do not doubt that many perineums are left to their fate because the physician thinks that silver sutures elaborately arranged are necessary, and distrusts his skill in applying them. It is a matter of common observation that clean silk will answer every pur-

[1] Am. Journ. Obst., January, 1884.

pose. A few stitches only are required, except when the laceration extends into the rectum. If the physician explains the situation and treats it as a matter of course, the woman will not object, and there is little pain. The after treatment will not differ from that appropriate to the stages after delivery in ordinary cases, the sutures being removed from the fifth to the tenth day or sooner if suppuration is noticed.

Care of the Mother.—The woman may now be made clean and comfortable by withdrawing the soiled clothes, washing the thighs, etc., placing a clean folded sheet under her and a napkin in front of the vulva to receive the discharges. These attentions may be left to a trained nurse if such is present; but very commonly the physician is the only one competent to attend to it, and he should allow neither dignity nor laziness to interfere with the proper care of the mother.

Cleanliness having been provided for, the obstetric binder should be applied. The abdomen has been suddenly emptied of a large bulk and the pressure upon the abdominal bloodvessels has been greatly altered. Nature, as usual, will attend to this—sometimes—by rapidly condensing the tissues of the abdominal walls so as to restore the proper adjustment. In the mean time the woman will be made more comfortable, to say the least, by a broad bandage, which shall encircle the body and take the place of the temporarily relaxed abdominal walls. It should be broad enough to extend from the ensiform cartilage to below the level of the trochanters. If it is not placed below the swell of the hips it is apt to

ride up and become a mere cord. Any material will answer, there being nothing more generally convenient than a wide kitchen towel. This should be evenly pinned around the body, not too tightly; the test of the proper appliance being that it makes the woman comfortable. If now the woman has a firmly contracted uterus and a comparatively slow pulse, we may congratulate ourselves upon the successful termination of the affair; or, to speak more accurately, of that stage which is most full of risks and which most often requires active assistance. For a superintendence of the case must still be maintained until the period of involution is passed and the woman ready to resume her place in the family.

Care of the Child.—The baby is now to be attended to. The nurse or other attendant (sometimes the doctor) should first anoint the child with fresh lard, which acts as a solvent of the vernix caseosa. It should then be rapidly washed, dried, and dressed. The physician will almost always be requested to "dress the navel." A square piece of soft rag, as dry as possible, should have a hole made in its centre. Through this the stump of the umbilical cord is passed and the cloth folded about it. The object is to protect the skin from contact with the cord, which soon becomes dry and hard. It also promotes the rapid desiccation of the cord, and, therefore, should not be greased before it is applied, as is sometimes done. The rapidity with which the cord dries and is separated from the umbilicus depends largely on the amount of Wharton's gelatine it contains. For this reason it is a good plan, when

we have a thick cord, to put the ligature an inch or so further away from the umbilicus than usual. Then when we have leisure we may take off the ligature and strip the cord between the finger and thumb so as to get rid of the superfluous gelatine. We may then make the cord somewhat shorter and retie it. In very warm weather it is a wise precaution to have the stump as slight as possible, as it sometimes becomes quite offensive.

AFTER-PAINS.—The rhythmic contractions of the uterus after labor which are superadded to its constant tonic contraction are sometimes attended with pain; rarely in primiparæ, but quite often in multiparæ. Even in the latter the frequency is greatly lessened by thorough expression of the placenta, since they appear to be largely due to the presence of blood-clots. Directions may be left that if these pains are so severe as greatly to annoy the woman, she may take a teaspoonful of paregoric every few hours.

The physician is now ready to leave, if the womb is well contracted, and after he has laid down the law somewhat as follows:

1. The baby is to be put to the breast as soon as the mother feels rested, or within an hour. This will aid in maintaining thorough uterine contraction.

2. It is to be nursed regularly every two hours during the day, and once or twice at night.

3. If it does not nurse, at least it is not to be fed artificially until the next visit of the physician.

4. When the baby ceases to nurse, the nipple is to be washed and dried, and not to be left moist and sodden with the milk and saliva.

5. The mother is to lie still in the bed, not necessarily in one position unless very weak.

6. Within a few hours she should sit upon a chamber placed in the bed and try to urinate.

7. The napkins should be changed frequently, when soiled by the lochial discharge, and the utmost cleanliness maintained.

8. The mother may eat whatever she pleases, but rarely, if ever, needs or is the better for alcoholic beverages.

9. The room is to be kept light and quiet. Visitors should wait for a reception day. The next visit should be made within twelve hours if possible; for in the bustle and excitement just after the birth, instructions are not always heeded, and carefulness now may save much trouble. The further management, no less important than the preceding, will be discussed in the chapter on the period after delivery.

CHAPTER IV.

UTERINE INERTIA.

The most common complication of labor is uterine inertia, which may be defined as any defect in the power, length, or frequency of the uterine contractions. If the contractions are feeble, transient, or infrequent, a labor which otherwise might have been normal, may continue for days, to the discomfort and even exhaustion of the patient. It will be well to consider briefly what the consequences of delay in labor are, especially as the fallacy is so prevalent that almost every labor is a physiological act. Mere duration, however long, is apt to be little regarded, although reflection must show that a labor cannot much exceed a brief period unless there is something wrong. A man who finds that it takes him a half hour to empty his urinary bladder, quickly comes to the physician for counsel. The doctor endeavors at once to find out and remove the cause of this unphysiological prolongation; yet he will straightway tell a woman in her twenty-fourth hour of labor that she must have a little patience; "Nature is sometimes a little slow." It may be that the something wrong is irremediable, and that we are compelled to allow the uterus to blunder along unaided. It will at least be a step in advance if it should be admitted that a long labor is a pathological labor, to be aided if possible.

Delay in labor in proportion to its extent, enfeebles and harasses the mother and endangers the child. The exhausting effect of pain upon the mother, and the dissipation of energy implied in the oft-recurring muscular action of the womb, make large drafts upon her strength. There are strong women and weak ones, and no rule can be laid down as to when the mere length of the labor becomes a serious matter. It is well to keep in remembrance the limits of normal labor, and to be disposed to interfere rather than to wait, especially if the means of interference should prove upon inspection to be innocuous. With every uterine contraction the placenta is compressed and the child's circulation interrupted. This is certainly necessary, and within reasonable bounds arranged for in the construction of the child. The great frequency of still-births after long labors (terminating unaided), is a sufficient proof that there is a limit to the child's endurance. We may, therefore, rationally regard the child as subjected to increasing risk with every added hour of labor. The mother is unfavorably influenced by mere apprehension in a long labor. She knows that there are many risks in childbirth, and until she is safely delivered she can scarcely avoid speculation as to her chances. This mental condition is by no means to be underrated. These considerations apply throughout the whole extent of labor, and, except in particular conditions, are the only consequences of mere delay during the first stage of labor, provided the membranes are unbroken and there is an average amount of fluid present. When the child is no longer surrounded

by liquor amnii, and the head comes to press upon the cervical segment or the vaginal walls, every moment of delay, whether in the first or second stage, diminishes the vitality of the maternal tissues. The mechanical pressure of the child's head cuts off their circulation in part; the cervix becomes œdematous and easily torn; vesico-vaginal and other fistulas result; the perineum loses its elasticity and strength, according to the level at which the head is situated when the delay occurs. These risks are modified by the cause of the delay, the constitution of the mother, and other circumstances, but to a certain extent are essentially present in every case which is allowed to exceed greatly the normal limit of continuance.

Pain and Contraction.—It is necessary to distinguish carefully between uterine contractions and the pain which accompanies them, although in common parlance we use the words labor-pain and contraction synonymously. It would scarcely be too much to say that the more pain the woman has the less the uterine contraction. It is often true that the woman may suffer greatly during a feeble uterine contraction. We must, therefore, in estimating the amount of uterine inertia in any case, be guided not by the woman's sensations, but by the palpable degree of uterine contraction, or the effect of the apparent contraction upon the progress of the labor. A half-dozen feeble contractions scattered through an hour may accomplish less than one good contraction, while the latter has the further advantage of being attended usually with less pain.

Uterine inertia is indeed the bugbear of obstetric

practice; consuming more time than all other causes of delay, and, it must be added, all the more exasperating, because it cannot always be remedied even by those who are most distrustful of Nature's methods and willing to supersede them.

Causes.—The causes of inertia are manifold, the principal ones coming under the following heads:

1. There may be organic defect in the uterine muscle, diminishing its power of contraction. In women who have had many children the womb sometimes acquires an excess of fibrous and uncontractile tissue, as it repeatedly passes through the process of involution. Its muscularity is worn out, as it were. In such cases the general relaxation of the tissues usually compensates in great measure for the feebleness of the contractions. Chronic areolar hyperplasia may have the same result in actually lessening the amount of muscular tissue competent to contract. Theoretically, a fatty degeneration of muscular fibre, normal after delivery, may occur prematurely; but this remains to be demonstrated as an actual occurrence.

2. Inflammation or congestion of any part of the sexual apparatus may lead indirectly to inertia. An endocervicitis with acrid discharge may exist. Coitus, using the sewing machine, and other agencies, may occasion a considerable congestion of the pelvic tissues in general. Whether an acute hyperæmia or actual inflammation be present, we may have as a first result hyperæsthesia, and although the uterine contractions are mainly involuntary they are decidedly lessened in those who shrink from pain. Hyperæsthesia is a somewhat relative term.

What may cause one to shriek with pain, may be borne by another with the stoicism of the red man. Such causes as are embraced under this head are common, and responsible for much of the pain and delay in labor.

3. General feebleness might be expected to figure as a cause of uterine inertia, but, strange to say, such is not always the case. Women in an advanced stage of phthisis may have energetic contractions and easy labors. The feebleness of disease rarely extends to the uterus in labor, but the feebleness of the fashionable woman, long trained to the disuse of all but the lingual muscles, often includes the uterine muscle as well. After labor has long continued the womb and woman may be alike tired, but fatigue does not often primarily occasion inertia.

4. When the uterus contains an excessive amount of liquor amnii, or more than one child, the contractions are enfeebled. This is not a paralysis from overdistention, it being doubtful if the womb is ever really distended by its contents. When the uterus is required to enlarge so much more than usual, it appears to have thinner walls, which, with the mechanical disadvantage which is implied by the increased convexity of its globe, sufficiently accounts for the slight power of the contracting fibres.

5. The contractions of the uterus may be defective because irregular; separate bundles of muscular fibres contracting without any general action. A spastic continuous contraction of the circular fibres about the os uteri constitutes the condition known as rigid os or cervix. A similar contraction of circular fibres at the os internum, or at a higher level,

is known as hour-glass contraction, uterine tetanus, and other names. But besides these well-recognized contractions of special groups of muscular fibres, we may have less obvious partial contraction of different muscular areas intermixed with nearly quiescent ones; so that while the womb appears to be contracting uniformly it will be found to have little strength. This condition may generally be detected by the circumstance that the womb does not have during the pain that uniform smooth tenseness which it should have, but is ridgy and irregular in outline. An elbow or knee of the child may perhaps be perceptible or palpable at the height of the contraction.

When uterine inertia is due to these irregular contractions, we will also find that the intervals between the pains become very irregular in length and the duration of the contraction itself is commonly much shortened. The pain is usually greatly increased, and is accompanied by continuous pain in the back or abdomen, so that the woman, especially if a primipara, is hardly able to tell whether she is having a real labor-pain or not at any given time. The cause of irregular contractions is very frequently the premature rupture of the membranes with complete escape of the liquor amnii. When this occurs, instead of the soft water-bag pressing against the cervix, the much less uniform and hard head is made to impinge against it. The uterine wall, instead of closing upon a uniform rounded sac, is goaded here and there into contraction by the projections of the child's body and limbs. Other

causes exist, and probably the next group of causes often act by developing irregular action.

6. Inertia may be due to the defective innervation or blood supply of the uterus or uterine nerve centre. This, in turn, may be caused by

(*a*) Malaria, using the term in its widest signification, so as to include the "bad air" of a close room. In a malarious neighborhood, the womb does its work slowly and apathetically, so to speak, even when the mother has not suffered from actual intermittent fever. There are, of course, great differences of susceptibility, not only to malarial poisoning in its obvious forms, but also to that indisposition to muscular exertion which is apt to affect those who dwell in a decidedly malarious atmosphere. An ill-ventilated room is also a common cause for the weakening and making infrequent the uterine contractions.

(*b*) Mental perturbation is another cause, operating probably through the vaso-motor apparatus. A sudden fright, the entrance into the lying-in room of an obnoxious person, dread of some accident in labor, and the like, may suspend the contractions for a time, or render them comparatively feeble. It is worth while to note, in passing, that mental influences may have also the opposite effect. As noted by Cazeaux, the threat of using instruments sometimes results in a decided increase of power in the uterine contractions. This was no doubt more often noticed when the forceps were less known and more terrible; but I have witnessed it several times in a marked manner. Low spirits, for reasons connected

with the labor or not, are a frequent concomitant, at least, of inertia.

(*c*) The uterus may act inefficiently because of an insufficient stimulus to contraction. Whatever other factors take part in causing labor to begin, a great part consists in the fact that the ovum, by partial detachment of the ripened decidua, becomes a foreign body in the womb. It is the irritation of this foreign body which finally stimulates the womb into contracting. But in some cases either the nerve centre or the uterus itself is comparatively insensitive, and the ovular irritation causes an insufficient stimulus. Contractions are instituted; regular, perhaps, and of normal frequency, but of little force. This is a condition wherein the old proverb, "*Morbum curatio ostendat*" is applicable. When we find that the contractions are made active and energetic by rubbing the uterus through the abdominal walls, by friction within the os uteri by the fingers, by the mere introduction of forceps blades within the uterus, it is a fair inference that the inertia was due to a temporary want of irritability in the uterine nerve apparatus, and that the child alone did not furnish a sufficient stimulus, since a slight increase in the amount of stimulus sufficed to restore the irritability. Whether the explanation is correct or not, the clinical fact is as stated, and the practical deduction is obvious.

(*d*) Disturbance of a reflex character may also modify the uterine contractions. If the bladder is allowed to become full, or the rectum distended with feces, imperfect and irregular contractions will very probably be the result. A full stomach or

acute indigestion may also promote inertia. *Per contra*, active intestinal peristalsis, as in diarrhœa, is apt to increase the uterine activity, and a dose of purgative medicine sometimes precipitates labor.

(*e*) Closely allied to the last, and perhaps rightly included with it, is a condition of general restlessness as a cause of inertia. The patient is fidgety, nervous, cannot content herself by lying down or standing up. John Power maintained that when the pains were both painful and inefficient, there was a metastasis of energy from the uterine muscle to the abdominal or to other tissues. However this may be, there seem to be cases in which the force which should be concentrated in uterine contraction is dissipated in restless movements of the voluntary muscles. This condition is often associated with spasm of the cervical fibres (rigid cervix), a hot and dry condition of the vagina, and some febrile disturbance. It may exist from the beginning of labor or be developed later. Restlessness is much more common in primiparæ and in those of the nervous and sanguine temperaments.

Treatment.—The multiplicity of causes warns us that there is no specific treatment for uterine inertia, and that what may greatly expedite matters in one labor may be valueless or even harmful in another. The first thing to be done in all cases is to place the patient under the best hygienic circumstances attainable. She should be comfortably clad, and all wet garments removed. The rectum should be emptied by an enema, if necessary, and the bladder carefully inspected. It will not do to rely upon the nurse or patient for information as to the fact of urination,

for the dribbling of liquor amnii is sometimes mistaken for a flow of urine. The room should be properly warmed and ventilated and any superfluous persons dismissed, in order to maintain good ventilation. It is here that "a merry heart doeth good like a medicine." Cheerfulness of deportment and due encouragement of the patient will often drive away depressing anxiety, and increase the power of the uterine contractions. A solemn-visaged, self-important man has no business in the lying-in room. Beyond such general means as these, there should be no attempt to relieve the inertia until we have endeavored to ascertain the cause. When this can be learned, we can usually succeed in materially improving the force of the contractions. It is by attention to such minute details that the physician can surely diminish the sufferings of labor to an extent incredible to those who are in the habit of allowing Nature to work unaided.

Massage, the stroking and rubbing of the uterus through the abdominal walls, is a proceeding which is widely used by uncivilized people. It affords a means of increasing the stimulus for the muscular fibres to contract, and is also capable of favorably modifying the uterine circulation. To be of obvious service, it needs to be patiently and persistently carried out for some time, and, being irksome, is but little resorted to.

Irritation of the Cervix.—We have a more direct approach to the uterus through the vagina. If two fingers are placed within the rim of the os uteri, and swept around with moderate pressure, the contractions may sometimes be improved. Titillation,

the term used by Cazeaux, is scarcely forcible enough; the pressure should be more decided in character. This proceeding may be alternated with active dilatation of the cervix. In accomplishing this, the two fingers within the os uteri are to be spread out so as to put the oral margin upon the stretch. This may be done in several directions, the fingers dilating, now laterally, and again obliquely or antero-posteriorly; making the pressure slowly, carefully, and with moderate force. This is especially useful when the inertia is associated with functional rigidity of the cervix from spasm. The stretching should then be maintained for as long as the fingers are able, in order to tire out the spasmodically contracted muscle. Otherwise it is to be repeated at intervals of an hour or half hour, and preferably during a labor-pain. While peculiarly applicable to cases of rigidity from spasm, it is often useful in overcoming inertia from other causes. What harm may this do? 1. If a man has very strong finger muscles (they would have to be much stronger than the average), and uses them rashly, he may lacerate the cervix. The fingers work at such a mechanical disadvantage that this risk is merely theoretical. It is very easy to notice the amount of dilatation which is being effected, and to stop if it seems to be proceeding too rapidly. The typically wire-edge rigid os is often too strong for the fingers to make any impression upon. 2. If one goes to the other extreme, and confines himself to a timid titillation of the cervix, he will cause the woman slight discomfort and do her no good, not a very serious matter. 3. If his fingers are dirty, he may sow the seed for a subse-

quent septicæmia or other disease; but this is a clearly preventable risk. 4. It is attended with more or less pain, which, however, can scarcely be noticed if it is done during a labor-pain.

On the other hand, the benefit derived is often great. One may sometimes completely put a stop to the wearisome backache and to the pains between pains which accompany irregular uterine contraction. It is a very valuable means of combating inertia; and, though like all other agencies of power it can be abused, the wise will not discard it on that account. The pain which it causes is usually slight, especially in the cases to which it is appropriate; and, if limited to the duration of the contraction, would scarcely be noticed by the mother in most cases.

Hot Water.—The uterus may also be directly stimulated by means of the hot water douche. A stream of water heated to 110° F., thrown against the cervix, is capable of materially increasing the power of the contractions. It aids, also, in promoting the free secretion of the cervical mucus, so necessary to the progress of the labor. It is especially applicable to cases in which hyperæsthesia of the cervix and vagina exists, and when the parts are hot and dry. It should be continued until several quarts of water have been used. It is probably not wise to use this when the child's head is in a position to receive the full effect of the heat. Where the vaginal douche is impracticable, an enema of hot water, small enough to be retained for some time, may be injected into the rectum with good effect. A sitz bath, also, is a measure which often does good.

Bearing Down.—We may sometimes improve the contractions by calling into action the abdominal muscles. In the latter part of the second stage of labor, bearing-down efforts with the abdominal muscles and diaphragm are involuntary or nearly so. During the first stage we may employ them at will. This method of uterine compression may be regarded as a form of natural massage more efficacious than could be otherwise employed. To get the best results, we may tie one end of a sheet to the bed-post at the foot of a bed, and give the other end to the woman, having twisted the sheet diagonally. When the labor pain comes on, she should be exhorted to pull upon this with a bearing-down effort, stopping when the uterine contraction ceases; or, when this is very brief, continuing the traction for at least a minute. This is a means of securing additional power in the second stage when there is a close fit between the head and pelvis, but may also be useful in the first stage as a means of overcoming inertia. Matthews Duncan calculates that the maximum power of the uterus is equivalent to a pressure of forty pounds, and that the bearing-down efforts may double this. During the first stage it should not be continued through a long time; but, if it is found to have effected no change in the contractions after a dozen trials, it should be abandoned as unnecessarily wasting the mother's strength.

Rupture of the Membranes.—Another means of stimulating the uterine muscle is the premature rupture of the membranes. When there is plainly a great excess of liquor amnii we may confidently expect to relieve the inertia in this manner, but

although there are other circumstances under which the measure is useful, no rule can at present be formulated as a guide. In a young primipara, of whose labor I have notes, the labor began at 1 A. M. The pains were at first frequent, afterwards coming on only at intervals of an hour. At the end of seventeen hours the os had attained a diameter of but three-quarters of an inch, in spite of various remedial measures. Internal pressure upon the cervix would excite a brief contraction at any time, but did not permanently increase their power or number. At 6.30 P. M., I ruptured the membranes, which were thick and roughened, allowing a few drachms of liquor amnii to escape. The pains at once increased and continued at intervals of five minutes or less until delivery was completed at 9.15 P. M. This is the only case in which I can recall a conspicuous good effect from the premature puncture of the membranes, except in cases of hydrops amnii. Nor after much comparison can I discover wherein it differed from other cases in which the puncture was employed with negative or even harmful results. For it must be remembered that ordinarily the premature rupture of the membranes does harm, being one of the most annoying accidents of labor; a prolific source of inertia and irregular contraction. It is therefore safer to limit its employment as a remedial measure to cases of excessive amount of liquor amnii. At best it lessens the rapidity of dilatation even when increasing the power of the contractions.

Drugs may be used sometimes with good effect. When we have reason to believe that the patient is

affected in any degree by malarial poisoning, quinine may be used with brilliant result. Five grains repeated in an hour will commonly be all that is needed. Even when no malarial complication can be demonstrated, it will sometimes succeed by virtue of its stimulant properties. A sleepy uterine nerve centre may be aroused by quinine and the general muscular tone improved. It has no special action upon the uterine muscle, acting indirectly but none the less effectively; and in any case of doubt may be used without fear. Oxytocics proper, are agents credited with a special action upon the womb, ergot being the typical drug of this class. Borax, cinnamon, and other remedies have been credited with a like power. Ergot is the most uncertain drug in the pharmacopœia; so uncertain that, although I have often used its various preparations, I am compelled to take the description of its action at second-hand, never having been able to persuade myself that I had witnessed its effect upon the womb. The classical description of Cazeaux[1] is as follows:

"The uterine contractions are observed to become more active in the course of ten or fifteen minutes after its administration, more frequent and energetic if they were previously slow or feeble, and reappearing if before suspended. Now, we cannot believe like the authors who have proscribed this medicine as useless, that the labor would have been restored without its use, for the thousands of instances in which its administration has always been followed by the same uniform result, will not permit us to consider the latter as the mere effect of chance;

[1] Page 908.

and besides, all those who make use of this article know full well that the contractions which attend the exhibition of ergot have a peculiar character that cannot be mistaken; for as soon as its action is felt they become permanent instead of intermittent; the uterine globe remains hard and contracted, and the pains are continual, though they are marked it is true, by exacerbations or paroxysms, and there are moments as in ordinary labor when the patient does not appear to suffer at all, and others where she makes loud cries or bearing-down efforts. The periods of repose are, however, only apparent, for the womb is constantly contracted on the product of conception and the hand if applied over the belly always finds this organ in a remarkable state of hardness."

The effect of this continuous tonic contraction of the womb upon the child is obvious. The placenta being constantly compressed, the child becomes asphyxiated. This I have witnessed in a tonic contraction without ergot. Mrs. Q., primipara. The first stage was fourteen hours long because of the premature rupture of the membranes at the beginning of labor. For a half hour after the full dilatation of the os the pains were few and feeble, when suddenly a nearly constant pain began, the uterus being permanently hard, and in a half hour the child was delivered, "black in the face," asphyxiated, and resuscitated with difficulty. If I had given ergot, I would have been warranted in supposing this tonic contraction to have been the result.

Not only is the child placed in jeopardy, but there is great danger of rupture of the uterus, laceration

of the cervix and perineum, and difficulty in extracting the after-birth, the cervical fibres appearing to be the ones most affected by its action. For these reasons (and the same result is reached by those who have failed to observe its specific effect), the majority of modern teachers condemn absolutely the employment of ergot before the delivery of the child, even when recommending its use during the third stage. Or to put it in the form of a dilemma: First, it is so uncertain as to be useless; second, its use is dangerous and unjustifiable. However tempting its employment may be at times, the practitioner who casts it away altogether as an obstetric remedy, will have few regrets afterwards.

In a case of placenta prævia, I found after delivery some difficulty in establishing good uterine contractions. Various remedies were employed while a messenger was despatched for some ergot. When this arrived, a teaspoonful of the fluid extract was at once given. It was scarcely swallowed before it was violently returned by emesis, and the uterus at once became firmly and permanently contracted. It is a matter of common observation that the labor-pains usually improve after an attack of spontaneous vomiting such as often occurs in labor, especially about the end of the first stage. The ancients acted upon this hint by giving emetics to improve the contractions. Sternutatories were also much employed, the act of sneezing causing a sudden and violent expulsive effort. The use of ipecac has been of late revived, and in suitable cases there can be no objection to its moderate use. It is not necessary to secure its full emetic action.

Opium and Chloral.—Instead of endeavoring to arouse directly the uterine energy, we may often improve matters by a contrary course. When a woman has become tired by some hours' continuance of feeble but painful contractions, and especially if she is in a restless, subfebrile condition, we may do great good by administering a full dose of opium or chloral. The latter should be given in a dose of fifteen or twenty grains, to be repeated in an hour. After a few hours or less of rest and perhaps sleep, the contractions usually reappear with greater force, regularity, and efficiency, and in the long run time will have been gained by the delay. Opium should be given with caution, if at all, to those who have headache, swollen feet, or other evidence of impaired kidneys. The chloral has few, if any, contraindications, and for this purpose two doses will usually suffice. Either alone or when combined with a larger portion of potassium bromide it is very useful in inertia from reflex disturbance and in spasmodic rigidity of the cervical fibres. If but a small dose of opium or chloral is given, we often obtain simply the primary stimulating action, and the contractions are at once improved without a preliminary rest. For this reason we cannot administer the remedy and then leave the patient, reckoning on a delay. There may be a precipitate ending. In any labor attended with much suffering, chloral is indicated and will disturb the uterine force less than any other remedy, while affording also more sure relief.

The Forceps.—These measures are intended principally for the relief of inertia in the first stage of labor. When the second stage is entered upon,

we possess other and better means, being, in fact, nearly independent of the womb. If the uterus will not expel the child, we may at will apply the forceps and deliver. Nor need subsequent hemorrhage be feared, for the almost invariable effect of the application of the forceps is to arouse the uterine contractions.

Kristeller's Method.—In any case where the use of the forceps is likely to meet with great opposition, it may be worth while to try Kristeller's plan of expression as follows: The physician stands by the patient, facing her feet. Both hands are to be placed on her abdomen so as to cover the uterus with as large a spread as possible, the fingers pointing downwards. During a contraction or at regular intervals without regard to the contractions, firm downward pressure is to be made in such wise as to force the child through the pelvic canal. I have seen this method excite the contractions or assist them so as quickly to terminate a long, lagging labor. It has not the certainty of the forceps, but is useful at times.

The treatment of inertia in the third stage may be best discussed under the head of post-partum hemorrhage.

Anæsthesia.—It is because feeble contractions are often more painful than strong ones, that the use of anæsthetics is more common in cases of uterine inertia than otherwise normal labor. It is a great mistake to suppose that the smothering of pain is an unmixed boon under any circumstances. The objections to the use of anæsthetics and especially chloroform during labor are as follows:

1. The risk to the child is great. Chloroform passes freely into the fœtal circulation when inhaled by the mother. Zweifel[1] has found the smell of chloroform on the breath of the new-born babe. In a case where it had been inhaled only during fifteen minutes, the placenta when placed in a close-fitting vessel gave out a strong smell of chloroform on the next day. He also found it by chemical evidence in the urine of the child. The records of such cases not infrequently close as follows: "The child was living at birth, but after an hour's persistent efforts at resuscitation could only be made to breathe very imperfectly and died in six hours."[2] Also, "the child respired a few times and the heart continued to beat for three-quarters of an hour, at the end of which time the child was dead."[3] I was once in a manner compelled to give chloroform to a woman in her twentieth labor, she having used it in all her labors during the last sixteen years. The child, a fine large one, gave a few gasps after birth and the heart beat for a half hour, but no efforts availed to save its life. No one has any right to jeopardize the child's life by the habitual use of chloroform merely to avert a little discomfort from the mother or for such slight causes.

2. The labor is protracted. It is claimed by some that when the anæsthetic is given moderately, the contractions are unimpaired; but, as a matter of fact, if it is really administered the contractions are enfeebled and the interval between them lengthened.

3. The risk of hemorrhage, post-partum, is very

[1] New York Medical Record, vol. ix. p. 460.

[2] Elliot, Obstet. Clinic, p. 16. [3] Ibid., p. 207.

greatly increased because the inertia which is developed by anæsthesia is apt to be protracted.

4. From the imperfect contraction of the womb after delivery, the mother is in increased danger of suffering from uterine thrombosis, septicæmia, and all the diseases of the puerperal period. Anæsthetics may be of great service when employed in eclampsia, in some cases of spasmodic rigidity of the cervix and of other uterine fibres, and in some painful operations. They should not be employed as a matter of routine to abolish the pain of labor. By so doing we fall into the habit of neglecting to ascertain the cause of the pain, which may often be promptly relieved without suspending the progress of the labor. A few drops of chloroform or ether on a handkerchief, held by the woman to her face, often quiets her by the mental effect of the operation. However used, it should be resorted to reluctantly and only as a remedial measure in default of a better plan.

CHAPTER V.

OBSTRUCTIONS CONNECTED WITH THE MATERNAL TISSUES.

Labor may be impeded by abnormal conditions of the os and cervix, of which the following are those principally met with, viz.: Rigidity of the cervix, œdema of its anterior lip, and displacements of the os uteri.

Rigidity of the cervix may be of two kinds, functional and organic. The former is due to spasm of the muscular fibres, the latter to an increase in the fibrous and uncontractile tissue of the cervix. Closely associated with this is atresia of the os, when, by reason of inflammation occurring during pregnancy, the os has become partially or entirely occluded.

In rigidity from spasm the oral margin is thin and tense, feeling often like a rim of bone. In organic rigidity the edge is thick and dense, the cervix being large, hypertrophied, and even cartilaginous in feeling. Spasmodic rigidity is commonly associated with uterine inertia, and its treatment has been already suggested. It remains to consider the proper course when such measures have proved inadequate or when the mother's condition makes rapid delivery a necessary event. Under such circumstances it may be treated substantially as in organic rigidity where the power to dilate is permanently affected. Mechanical dilators, such as the rubber bags of Barnes

or Molesworth, may be used to distend forcibly a refractory cervix. If inflated slowly with warm water, they are not likely to do any harm, even in the rare event of their bursting under undue pressure.

When these are not attainable, the hand may be used instead. It may be passed into the vagina and the fingers gradually insinuated into the os, and then cautiously spread out, great power being obtained in this way. To justify such a measure we must have exhausted all lesser means of dilating the cervix and be convinced that further delay would be of serious detriment to either the mother or child When the os uteri has attained a diameter sufficient to admit of the introduction of the obstetric forceps, we are in possession of a more powerful means of dilatation. The head being grasped by the forceps may be drawn down at regular intervals and made to dilate the cervix. While one makes traction an assistant should hold a finger upon the anterior lip and elsewhere, so as to observe the effect of the stretching, and warn the operator when the traction has continued long enough. In this way, a case seen in the practice of my colleague, Dr. Loving, wherein the os uteri was but two and a quarter inches in diameter, after two days of labor, was delivered without accident of any kind in fifty minutes. It should, however, be regarded as a serious operation, scarcely to be undertaken without advice. A physician who is not well acquainted with the normal mechanism of labor, and who has not already attained some skill in the use of the forceps under ordinary circumstances, should not attempt so formidable a proceeding. Should the cervix be lace-

rated, it will be better for all concerned that a consultation shall have been held.

In true hypertrophy of the cervix it is sometimes necessary to resort to incisions. The famous case of Roper may serve in some respects as a model. In this case the cervix had attained a length of four inches, and was as thick as a man's wrist, being hard and firm. After forty hours' labor seven incisions were made, followed by gradual expansion for sixteen hours, after which the forceps were successfully applied, and a living child extracted. In the rare instances where incisions are demanded, the patient should be placed in Sims's position, a speculum introduced, and radiating incisions made with a probe-pointed bistoury. When atresia exists the incisions must be made at once and in the same manner.

Tumors in the cervix, and especially cancer, are occasionally met with. No rules can be given for their general management, since no two cases are alike. Fibroid tumors may sometimes be enucleated. The Cæsarean section may be required where the exit of the child is completely obstructed. In other cases craniotomy may be the proper operation.

Œdema of the Cervix.—When the anterior lip of the cervix is nipped by the pressure of the head in a close-fitting pelvis, it not only is prevented from retracting upwards, but its circulation may be interfered with. It then at times becomes œdematous, which not only acts as an impediment to the advance of the head, but may lead to sloughing of the cervix if unrelieved. Œdema of the cervix is readily recognized by the touch, and should always be re-

garded as a warrant for speedier interference than the other circumstances of the case might seem to demand. It is sometimes possible by manipulation in the absence of a contraction, and when the pressure of the head is least, to retract the anterior lip over the occiput, and thus to reduce the œdema. If not, the quicker the woman is delivered the better, if it can be done without incurring other and more serious risks.

Displacement of the Os.—The os uteri may be displaced to an extent which gives rise to difficulty in labor. This may be due to an exaggeration of the natural lateral obliquity of the womb, causing the os to present so far from the centre of the pelvic canal that the head is pressed against the uterine and pelvic walls, and not against the orifice of the uterus. The os may also present directly backwards. In the condition known as pendulous abdomen, when the abdominal walls are either very lax or deficient, the fundus is allowed to hang forward over the pubes to a considerable extent, and in consequence the os is dragged upwards in the neighborhood of the promontory. A fibroid tumor in the posterior wall of the uterus may also cause this displacement. When labor comes on the head is forced against the anterior lip until the muscle is stretched so that it may seem no thicker than the fœtal membranes. There is danger of mistaking the thinned uterine wall for the membranes, and also danger of spontaneous laceration. There may also be some difficulty in finding the os uteri from the extreme thinness of its edges, as well as from its remoteness. It can be found by introducing the

hand into the vagina, if the fingers are not long enough to reach. When found, two fingers should be hooked under the margin, and while they are employed in drawing the os into its proper place the other hand may assist by pressing the fundus in a contrary direction. If necessary, a bandage around the abdomen may be used to maintain the proper position, but as a general thing the recumbent posture will be sufficient.

Uterine Prolapse.—The descriptions of text-books and lecturers usually send out the young practitioner with the idea that the head is always placed at or above the superior strait, until after the os has been dilated, after which it descends. He, therefore, encounters with some surprise the not uncommon circumstance of finding the labor barely begun, the os admitting only the finger-tip, and yet the head is at the inferior strait, so low down that as he begins his examination he congratulates himself upon the advanced stage of the labor. This is due to a large pelvis permitting the prolapse of the womb, and is also frequently associated with premature rupture of the membranes. The dilatation of the os is accomplished slowly in these cases, and there is no special remedy except mutual patience.

Vaginal Obstructions.—Obstacles to delivery at a lower point than the os uteri are uncommon. The calibre of the vagina may be small throughout; atresia may exist at any point from congenital or inflammatory causes; bands of cicatricial tissue may exist, or a septum between the two halves of a partially double vagina may act as a band; the hymen is sometimes persistent and rarely may be

nearly imperforate; the perineal muscles are at times spastically rigid, furnishing a similar obstacle to the rigid cervix.

Obstructing bands may be incised by the knife when put on stretch by the advancing head, but one should not be hasty to resort to such means. It has been recommended to make numerous incisions in the margin of a rigid perineum in order to prevent a laceration in the median line. Episiotomy, as this operation is called, is seldom warranted. The forceps are usually a better resource and it is scarcely logical to make lacerations in order to avert one. The forceps are also indicated when the calibre of the vagina is small, as also in any case where the resistance of the maternal tissues to the advance of the head is too great to be overcome by the uterine contractions. A rigid perineum may sometimes be relaxed by stretching it with the fingers. Two fingers passed into the vagina and hooked over the perineum may pull it downwards and backwards with some force. This also excites the involuntary action of the abdominal muscles. It is scarcely necessary to add that this is a measure to be used with judgment and not indiscriminately. The vaginal mucus which flows copiously over the perineum during labor has also a relaxing effect, and when absent or diminished should be restored by the use of warm applications.

Œdema of the Labia.—The external genitals seldom offer any obstacle to labor. Œdema of the labia, associated with general anasarca or with swelling of the lower extremities, is occasionally met with. When extensive, it diminishes the calibre of the

ostium vaginæ, and may thus hinder the exit of the head. Multiple punctures with a bistoury, made early in the labor, are useful, allowing the fluid to drain away.

Thrombus of one or both labia is an accident of more importance, but quite rare. It may occur during labor from the subcutaneous rupture of varicose veins or from injury to the bulb of the vagina, or at any time from external violence. The tumor is of variable size and may have the same mechanical effect as œdema in obstructing the vaginal outlet. If small, it can be disregarded; but if large, the appropriate treatment is to make a free incision, turn out the clot, and, if necessary, apply hæmostatics, preferably hot water and tinct. iodinii.

Hernia, etc.—A hernia, especially if irreducible, is in danger of strangulation during labor. The subject of a hernia should not be allowed to bear down if it can be avoided, and the second stage should be terminated by the forceps if any considerable delay occurs or threatens. The same rule will apply to all physical disabilities which involve risk to life. A woman with heart disease or any acute or chronic disorder should be delivered as promptly as it can be done, without introducing additional dangers into the case.

Syncope occasionally happens in labor, delaying it temporarily. Unless due to organic cardiac disease or to hemorrhage, it is of little importance, and is to be treated as when occurring at any other time.

Emphysema.—A curious complication which does not interfere with labor except by exciting apprehension may be noted here, viz., emphysema of the

chest and neck. During powerful bearing-down efforts it occasionally happens that some of the air vesicles of the lungs are not equal to the strain and are ruptured. Air then escapes by way of a mediastinal space into the cellular tissue of the shoulder, neck, and face, being usually limited to one side. It is certainly alarming to the patient to find the neck suddenly enlarged until its surface is flush with that of the face or even bulging. The swelling crackles under the fingers and cannot be mistaken for anything else. The remedy is to let it alone with great care, in which case it may be expected to subside innocuously in a few days.

Hæmoptysis may be brought about by the expulsive efforts, especially in those of a consumptive tendency. It would be proper to expedite delivery in such a case.

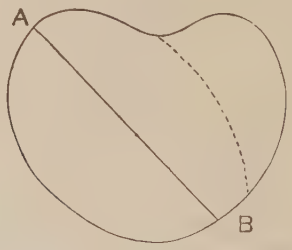
Deformities of the Pelvis.—A deformed pelvis constitutes the most complete obstacle to delivery if the departure from the normal type is great. The study of pelvic deformities, their nature and causes, is of great interest, but cannot be included in a short practical treatise. For a thorough account the reader is referred to Lusk's *Midwifery*. Their occurrence is not frequent except in our large cities, where European immigrants predominate, and some general remarks on the usual difficulties presented will be sufficient to serve as a guide.

The pelvis may be deformed by being too small in all its diameters. This is the result of imperfect development, the pelvis having ceased to grow at too early an age. It therefore follows that such a pelvis will approach the masculine type, being narrowed

and with a less roomy subpubic arch. It is not necessarily associated with dwarfish stature, but may be found most often in women who have performed hard work in girlhood and whose puberty was retarded. The normal shape may be so little interfered with that the usual mechanism is not altered, except in that the increased resistance requires complete flexion, moulding of the head, and much loss of time and strength. A large fœtal head is a much more common cause of disproportion, and a diagnosis of small pelvis should not be made without careful measurement. In the great majority of other forms of deformity, the obstruction is confined to the pelvic inlet, and may practically be considered as involving mainly the following points:

1. The conjugate diameter of the inlet is lessened, and its decrease is a fair measure of the deformity and difficulty in delivery.

FIG. 3.



Outline of the normal inlet. The dotted line completes the outline enclosing the head in the first and third positions.

A B. The right oblique diameter.

2. The oblique diameters (or the one in which alone the head can lie) are made to approximate to the transverse diameter of the inlet; or, in other

words, the head must enter the inlet more nearly transversely than in the normal pelvis (Figs. 3, 4, and 5).

FIG. 4.

Outline of a pelvis deformed by disease of left sacro-iliac joint.

A B. The right oblique diameter, more nearly transverse than in Fig. 3, and the whole space narrower.

3. The promontory of the sacrum is made to jut forward, either absolutely or in effect; and, as a result, the axis of the womb is thrown in front of

FIG. 5.

Outline of a pelvis deformed by rachitis.

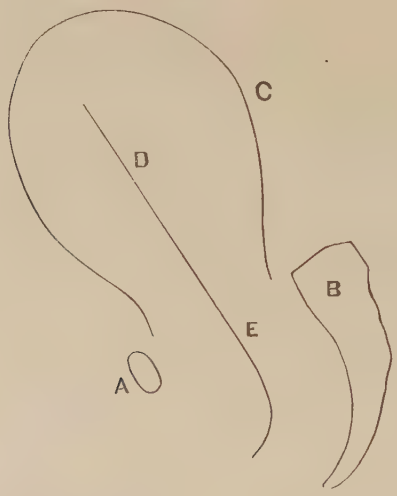
A B. The right oblique diameter, still more transverse.

the pelvic axis, instead of being continuous with it (Figs. 6 and 7).

This alters the mechanism of delivery by preventing the head from entering the inlet, because the uterus forces it forwards upon the pubes. From this results the great frequency of transverse presentations and other abnormal positions of the child in deformed pelves. The child's head is required to move around the promontory before it can enter the

pelvis, in a curve called by Barnes "the curve of the false promontory." This is of especial importance in making traction with the forceps. The head must be *pushed backwards* before it will even enter the pelvis. A pelvis may be considerably deformed, and yet interfere but little with the natural

FIG. 6.



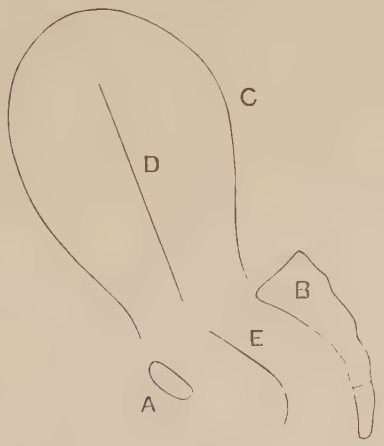
A. The symphysis pubis.
B. The sacrum.
C. The uterus.
D. The axis of the uterus continuous with the pelvic axis E.

mechanism, if the head enters in a favorable position. But in the great majority of cases the three factors just enumerated are present and obstruct the labor in direct proportion to the amount. When a head escapes through a deformed inlet, it usually meets with no further difficulty. The body of the child may be difficult to deliver if the obstruction is great,

but can be made to pass wherever the head has passed, unless itself enlarged by malformation or disease.

The outlet of the pelvis may be deformed by a too close approximation of the ischial bones. This is not common, and usually requires only the applica-

Fig. 7.



A. The symphysis pubis.
B. The sacrum.
C. The uterus.
D. The axis of the uterus.
E. The axis of the pelvis.

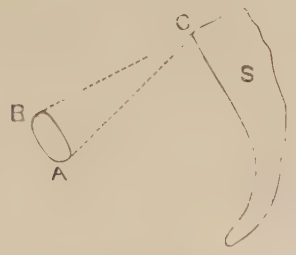
tion of the forceps to remedy it. The sacro-coccygeal joint may be stiff and unyielding, or even ankylosed. This is especially met with in old primiparæ. Considerable force is sometimes required to extract the child, which is liable to have a flattened nose for some days on account of the pressure to which it is subjected.

Pelvimetry.—In estimating the size of a deformed pelvic inlet, the most important measurement to be made is of the conjugate diameter. Further information is to be obtained by introducing the hand into the vagina and carefully noting the manner and extent to which the fingers may be moved in all directions. External pelvimetry, while of undoubted service in large averages, is of no use in an individual case. The most common application of it is to measure the conjugate diameter by means of Baudelocque's calipers or the like instrument. One point of the calipers is placed on the back over the sacrum, the other over the symphysis pubis, and the distance between is noted. We then guess how thick the sacrum and dorsal tissues are, and how thick the symphysis must be, and, deducting these measurements, we can guess how long the conjugate diameter is, which might have been done without so much trouble in measuring. What we desire to know is, not whether the woman's sacrum is of average thickness, but how long is the conjugate diameter, and the need for accuracy is too great to make it worth while to waste time in inaccurate external measurements.

The proper method consists in introducing the fingers (two may be enough) into the vagina, the hand being held in semi-supination. When we succeed in touching the promontory, we note exactly where the anterior vulvar commissure touches the skin of the hand. From this point to the finger-tip we measure, and this will give us exactly the diagonal conjugate (Fig. 8). Since the inner face of the symphysis is perpendicular, we have the hypothenuse of

a right-angled triangle, the right angle at B, and we can easily measure A B also. The thickness of the symphysis may be measured and deducted from both A B and A C. Then, since $(A\ C)^2 = (A\ B)^2 + (B\ C)^2$ (Euclid I. 47), we may ascertain the exact length of the conjugate diameter. If we cannot reach the

FIG. 8.



A B. The symphysis.
B C. The conjugate diameter.
A C. The diagonal conjugate.
S. The sacrum.

promontory, we may be sure that the conjugate is of average or more than average length.

General Remarks.—With the deformed pelvis, all the complications of midwifery are liable to be associated, and all the obstetric operations may be needed to secure delivery. Owing to the want of correspondence of the uterine and pelvic axes, malpresentations are very common. The unusual resistance is apt to excite powerful contractions, and rupture of the uterus is always to be regarded as a possibility. The irregularity of the pelvic inlet allows of prolapse of the funis and extremities of the child, and leads to premature escape of the liquor amnii. The great pressure, obliquely applied, often

results in subsequent sloughing of the cervix, vagina, and other tissues, so that it is not as safe to allow labor to continue for a long time in a deformed as in a normal pelvis. Those who are enamored of leaving the case to Nature may well inquire whether in these cases it is not the intent of Nature to destroy both mother and child, in order that the pelvic deformity may not be perpetuated by heredity. Certain it is that where the most favorable conditions are needed to compensate for the obstruction, the most unfavorable conditions are apt to accompany it.

Treatment.—1. We should endeavor, by means of the forceps or version, to deliver. The choice is to be determined by the nature and extent of the deformity and the presentation.

2. Failing with these, we may again choose between embryotomy and the Cæsarean section.

3. If we are aware of the deformity in time, and it is not incompatible with the birth of a living child, we should induce labor soon after the child becomes viable, in order to have it smaller and easier to deliver.

CHAPTER VI.

OVULAR DYSTOCIA.

The several parts of the ovum and fœtus may complicate the labor, and in various ways. *The membranes* may impede labor by unusual thickness, so as to require a cutting instrument to effect their rupture. When tough and elastic, they may stretch to such an extent that the child may be born with its head still enveloped in the membranes. This is called being born with a caul, and the membranes in such case are said to be in high repute as a preventive against death by drowning, though I have never encountered the superstition in this country. Much more frequently the membranes are too thin, and by their premature rupture and the destruction of the bag of waters, interfere with the dilatation of the cervix.

Some perplexity is occasionally caused by the presence of fluid between the amniotic and chorionic layers of the membranes. Under such circumstances a bag of waters may form, be ruptured, and discharge its contents, and yet on a subsequent examination another bag appears to have taken its place. The first rupture evacuated the subchorionic fluid and allowed the true amniotic bag of waters to descend. I have seen this occur with an interval of several days; the first escape of fluid being followed

by a cessation of pains for that time. This may be confounded with the simultaneous presentation of two ovular sacs in the case of twins, which has been noted by Tarnier.

Hydrops Amnii.—The amniotic fluid may be in great excess, which condition is known as dropsy of the amnion. The normal amount of liquor amnii is very indefinite, so that it is difficult to draw the line as to amount. When it is no longer to be measured in ounces, but in pints, quarts, or gallons, as sometimes occurs, it may fairly be considered excessive. The production of injury to the mother or child is a better criterion. The child is commonly feeble and ill-developed, and its movements are slightly felt by the mother or not at all. The great bulk of the uterus which it occasions, inconveniences the mother, interfering with her respiration, even to threatened suffocation in some cases. During labor it causes uterine inertia throughout, and is attended with great risk of hemorrhage both during and after the delivery. The diagnosis is easy when the membranes are ruptured, but before and early in labor it may be more difficult to distinguish it from ascites, or the presence of several children, in each of which conditions the abdomen may be uncomfortably or dangerously distended. Where the great bulk is due to twins we may usually by palpation through the abdominal walls make out the limbs and protuberances of a child or children, which cannot be done if there is any considerable ascites or amniotic dropsy. In ascites we have usually the symptoms of renal, cardiac, or other causative disease, with some fever and pronounced ill-health. In amniotic

dropsy, such symptoms are generally absent, the patient being uncomfortable rather than ill. It may be necessary to evacuate the fluid before the full term of gestation on account of the mother's condition. Whenever the puncture is made, the physician should be in readiness to deliver at once, either by the forceps or by version, as the position of the child and state of the os uteri may determine. For the placenta is liable to be prematurely detached, giving rise to frightful hemorrhage which cannot well be controlled until the womb is first emptied of all its contents. It will be safer in any case where a large amount of fluid is to escape suddenly, to have ready a bandage to be applied around the abdomen; and in view of the need for speedy delivery, which may at times occur and sufficiently occupy the attention of the physician, it will be better to apply the bandage before the rupture of the membranes is made. A many-tailed bandage in the hands of an assistant will relieve the physician of any anxiety on this score. Stimulants should also be within speedy reach.

Deficiency of liquor amnii may occur, the fluid being so slight in amount that no bag of waters at all is formed; which is called a dry labor. The first stage of labor will be lengthened by this cause, and so may the second stage if the physician fails to note that the membranes are unbroken. I have seen a long delay from this cause. Otherwise a dry labor does no harm.

Prolapse of the Funis.—The umbilical cord may complicate matters by prolapsing past the head or other presenting part. A small knuckle may pro-

trude through the os or a loop of several inches may descend, and even extend to the vulva. The tyro, who will find it somewhat resembling intestine, may distinguish it by noting that the fingers may meet around the funis, while with the intestine the mesentery will intervene. Where a suspicion of uterine rupture exists, this discrimination may be necessary. Prolapse of the funis is not apt to occur as a solitary complication. Malpositions of the child dispose to it because the pelvic brim is not so well filled up as by the natural position, and for the same reason it is frequently met with in labors occurring in deformed pelves. A low implantation of the placenta has also been noted as a cause, and, indirectly, a cord of unusual length. A sudden and copious escape of liquor amnii, as in dropsy of the amnion, is also a cause. The mere fact of prolapse itself does not interfere with the progress of the labor in any way, so that the mother is not harmed by its occurrence. The chance that the child will survive the compression of the cord during the descent and expulsion of the head and body is not very great, though the mortality of seventy-five per cent., recorded by Collins, is hardly to be expected at present. When met with, it is first in order to try to replace it. If but a small knuckle protrudes, we may often succeed in pushing it up and retaining it with a small piece of sponge, which being compressible, will not offer much of an obstacle to delivery. When a large amount has prolapsed, and often in our efforts to replace we bring down more, nothing short of introducing the hand and carrying the funis high up into the womb will answer. This may succeed if we can

hook the funis upon a projecting heel or the like, but it is often impracticable, and sometimes the cord follows the retreating hand. The various repositors which have been recommended from time to time are also uncertain aids. It is, therefore, well to avoid extraordinary attempts at replacement and confine our efforts to simple manipulation with the fingers. We are sometimes aided by placing the woman in the knee-chest position; kneeling with the face and upper part of the chest resting on the bed, the arms being spread out. In this way the pelvis is made the highest part of the body, and gravity helps both the head and funis to be pushed away from the pelvic brim. If we are successful in replacing the funis, the woman should not resume the recumbent position until the contractions have forced the head down far enough to prevent a return. But as this position is irksome, it may be exchanged for the Sims's position after the replacement. During the first stage the amount of compression in the cord will usually be slight and intermittent, and especially if the funis, as is usual, is under a sacro-iliac arch. As soon as possible the forceps should be applied and the child delivered with promptness. In this way a large proportion of children may be saved, even when efforts at replacing the cord have failed. If at any time during the progress of the case we can assure ourselves that the pulsations in the cord have ceased, the case may be left to take its course irrespective of this accident. In this as in other conditions affecting the life of the child, the family, though, if possible, not the mother, should

always be informed of the possibilities in the case, that the physician may not afterwards be blamed.

Short Funis.—The cord may impede labor by being too short, the shortness being either original or acquired. A cord originally of sufficient length may become too short by being wrapped about the neck or body of the child, or by being twisted into knots; which may happen from the gyrations of the fœtus in the middle period of pregnancy. It is very common to find the cord wrapped once around the neck, and three coils are not at all rare, but the shortening to such an extent as to obstruct labor is exceptional. Cords of seven or eight inches in length or less, have been observed, which not being long enough to reach from the placental site to the outside, confine the child by too short a tether. If the length is sufficient to permit the head to be born, the hand passed into the vagina and over the child's abdomen will discover the tenseness of the cord and be able to divide it. An unusual delay or resistance in the extraction of the body of the child would suggest this difficulty, since there is seldom much force needed to draw out the shoulders. Where the shortness is so extreme that the child can only descend in the pelvic canal for a short distance, the diagnosis is difficult and the complication a dangerous one. The diagnosis is to be based upon the following points:

1. The delay without obvious cause, the contractions being usually unimpaired or even stronger than common.

2. The occurrence of fixed pain in the abdomen, greatly increased during the uterine contraction.

3. The advance of the head with each pain followed by its sudden retraction, this being due to the elasticity of the cord and of the placental site. Whether the diagnosis is determined upon or not, the usual rule for delay in labor will lead us sooner or later to apply the forceps, which is the best thing to do. Very strong traction may be necessary, and the uterine wall under the placental site may be temporarily inverted. But the most probable as well as most favorable occurrence would be the breaking of the cord, which sometimes takes place even in unaided cases. The placenta may also be detached, though this is less likely to happen.

Detention of the Shoulders.—More common is an accident which may be confounded with the very short cord before delivery. The shoulders are sometimes situated antero-posteriorly at the brim after the head has descended. They occupy or lie across the conjugate diameter instead of one of the oblique diameters. They are, therefore, detained at this point, being too large to enter the pelvis in this manner. In a case seen in consultation, the head had remained at the inferior strait for about five hours, the occasion of my being sent for having been an attack of eclampsia. The forceps were applied, but extreme traction was required to effect delivery. As soon as the head was born and released from the forceps, it was suddenly drawn back against the vulva as if retracted by a spring. The shoulders were then found to be still at the brim of the pelvis, the neck having been stretched to twice its natural length. In another case, three pains of moderate force propelled the head to the inferior strait after

full dilatation of the os had occurred. No change took place for an hour and a half. By manipulation of the abdomen the forward shoulder was discovered to be projecting over the pubes and was pushed to one side during a contraction. Before the pain had ceased, the child was born.

The distinction between this and the short cord is mainly established by the absence of pain in a fixed place. Palpation of the abdomen does not always help us, for the shoulders may be wedged in the inlet rather than perched above it. The retraction of the head is not so sudden after the uterine contraction, and is more like the natural movement of recession of the head except in being complete and without advance afterwards.

Arm Behind Head.—A very rare complication in which sudden and complete retraction of the head may be noticed, is the displacement of an arm behind the child's head. This was first noticed by Simpson and has been encountered but a few times since. The arm acts as a spring, allowing the head to descend with a contraction and then jerking it abruptly back. The diagnosis cannot be made without the introduction of the hand into the womb, after which the proper course is to perform version if possible.

Prolapse of Arm.—The hand or arm may prolapse alongside of the head which, although not as dangerous to the child as a prolapsed funis, may cause great delay and difficulty in the delivery. When the hand alone is placed by the head, it does not in itself lead to much trouble if there is no disproportion existing between the head and pelvis, and

it is usually retracted as the head descends. If the arm is prolapsed to any extent it may be a serious matter, the difficulty increasing with each pain and attempt to advance. Should the child descend in spite of this complication, the perineum will be in great danger of being plowed through with the arm. Every endeavor should be made to replace it as early in the labor as possible, the methods being similar to those for replacing the funis. In pushing an arm above the head it should be pushed towards or across the face to insure its coming in front of the body. If more than a forearm prolapses it becomes a shoulder presentation, and is to be treated accordingly. Where reposition cannot be effected podalic version should be performed, unless the head has already descended well into the pelvis, in which case there will probably be room for the combination to pass either by the uterine contractions or aided by the forceps.

Head and Foot.—The foot is sometimes found to present alongside of the head, and as misfortunes rarely come singly, this presentation is usually complicated with prolapse of the funis and of one or more arms. There are less than a score of recorded cases, though it probably occurs more often than it is reported. The presence of the foot alongside of the head is an evidence that the child is doubled up, and if this posture has lasted any time, it is further certain that the child is dead, since it cannot be maintained in a living child clasped by the uterus.

In a case seen with Dr. Wheaton, the second child of a pair of twins presented in this manner imme-

diately after the birth of the first. One ankle was seized and drawn down, while the head was pushed up both by a finger in the vagina and a hand on the woman's abdomen. Turning was rapidly effected and a living child delivered. The testimony of the recorded cases is[1] that when immediate version cannot be performed we should proceed to perform craniotomy. This will easily effect delivery, while the forceps will succeed with great difficulty if at all, nor will they save the life of the child.

In this condition and also in prolapse of the arm, the possibility should be kept in mind that the head and extremity may not belong to the same body, but may pertain to separate twins. The foot or arm of one child may have descended with the head of another. Version is therefore to be performed with great caution and attention to the effect of each manipulation, lest in the endeavor to assist the case should be more seriously complicated.

The Large Head.—The large size of the fœtus and especially of the fœtal head, is a frequent source of delay in labor. The question of size is also a relative one. A head may be of average size—*i. e.*, with three and a half inches in the biparietal diameter—and yet be inconveniently large for a particular pelvis. The pelvis and fœtal head are in proportion to one another in any fixed type of mankind. If a woman belonging to a small headed race marries a man of a large headed race, the child will probably have a head too large to pass through her pelvis without much delay and moulding. In

[1] See Amer. Journ. of Obst., January, 1882.

this country the mixture of races and different strains of blood is so extensive, especially in large cities, that this cause of delayed labor is common. The average weight of the American child at birth is greater also than that of the European child. Cazeaux saw but one child weighing over ten pounds. Children of twelve pounds weight are far from uncommon, and I have seen several of thirteen and fifteen pounds. A giantess in Ohio gave birth to a child (in 1879) weighing twenty-three and three-fourths pounds. It is to be regretted that we possess no good means of estimating the size of a child's head before birth. Experience confers skill in this as in most matters, but the most expert are sometimes unable to determine the real size within considerable limits. We have then a plain rule for the management of these cases. When the head fails to advance after a reasonable prolongation of the second stage, the forceps should be applied, and subsequent proceedings regulated according to the rules for the obstetric operations in general.

Hydrocephalus.—The head is sometimes enlarged, not by a natural development, but by hydrocephalus. In extreme cases the head is converted into a mere cyst, with thin bony plates representing the cranial bones. In minor degrees we have very wide sutures and large fontanelles, and the bones may sometimes be made to crackle under the pressure of the finger. The amount of fluid varies from a few ounces to more than a gallon. The diagnosis of the greater degrees of hydrocephalus is not at all difficult. In moderate degrees we will be aided by the application of the forceps, when the divergence of the handles

will demonstrate the large size of the head. Diagnosis may be very obscure when the breech presents and the head is arrested at the inlet. Aid may often be afforded by the quite common association of *spina bifida* with hydrocephalus. Otherwise the large size of the undelivered part will give a clew.

Although it is sometimes possible for a hydrocephalic head to be expelled by the natural efforts, with or without previous rupture of the cranium, it will be good practice to perforate at once when convinced of the diagnosis. The disease is hopeless, incurable, shocking; and there need be no hesitation in adopting this method of delivery. Usually the bones and scalp collapse when the fluid is evacuated; the head is then either extruded by the uterus, or can be pulled down by the finger hooked into the perforation, or by the craniotomy forceps. The obstetric forceps are seldom competent to extract the nearly incompressible hydrocephalic head, but are useful in diagnosis. Perforation of the after-coming head in a breech case may be difficult if the head globe is large and cannot be made to enter the pelvis. Under such circumstances the suggestion of Tarnier may be put into operation. He recommends an incision between the spinous processes of the child's vertebræ so as to introduce a styletted gum catheter, which being pushed onwards and into the cranial cavity, will discharge the water and allow the head to collapse.

Miscellaneous Conditions.—Watery effusions in other localities than the cranium are still more uncommon. Hydrothorax, abdominal ascites, œdema of the limbs or scrotum, may exist in the fœtus to such an extent

as to cause delay in labor. Distention of the fœtal bladder is also mentioned as a possible cause. Putridity of the fœtus from retention after its death may result in a gaseous distention of the areolar tissue of the whole body. Inflammation during intrauterine life may lead to hypertrophic enlargement of limbs or other parts. Inflamed joints may become ankylosed in awkward positions. Tumors, though rarely, may be developed in the fœtus. In all these cases the general principles of management are alike. First, to make as accurate a diagnosis as possible. Second, to allow the natural efforts a fair opportunity to effect delivery when the mother's condition is good and natural delivery is not obviously impracticable. Third, to deliver by forceps, version, or other conservative operation, according to the nature of the presentation and other circumstances. Fourth, to mutilate the fœtus to a sufficient extent to enable us to deliver it if other means fail. Perforation may be a conservative method, if in abdominal ascites we evacuate the fluid with a trocar. The possibility of the child being alive and capable of continued existence should always be taken into consideration, whatever disease or deformity it may suffer from.

CHAPTER VII.

ABNORMAL PRESENTATIONS AND POSITIONS.

In the foregoing pages the child has been considered as presenting in the left occipito-anterior (L. O. A.) position of the vertex, unless expressly stated otherwise. This position is the normal one, for which the pelvis is adapted, and the one actually present in the great majority of cases. The second position of the vertex, the right occipito-anterior (R. O. A.) is nearly as natural a position; but even in this, the fact that the left oblique diameter is shorter than the right, and further shortened by the presence of the rectum, is enough to make a considerable difference in the average ease of delivery. All other presentations and positions have elements of danger and difficulty, which require us to class them as abnormal. It is true that each has a natural mechanism by which it may be delivered under favorable circumstances, but the delivery is subject to risks and impediments which do not affect the first position of the vertex presentation. The limits of this work do not allow of space for a full demonstration of this. Referring the reader elsewhere[1] for an account of the mechanism in normal labor, we will proceed to recount in order the assistance to be rendered in each position, with such prefatory

[1] See Appendix to author's Compend of Obstetrics.

statement of the natural mechanism as may be necessary to illustrate the reason for the assistance.[1]

Occipito-posterior Positions.—The right occipito-posterior (R. O. P.) position of the vertex presentation is a common complication of labor. The left occipito-posterior is much less common, and follows the same course, with due change of right to left, and *vice versâ* in the description.

The R. O. P. position has several spontaneous methods of delivery, and it is proper to rehearse them before attempting to interfere.

1. The head may follow substantially the same mechanism as does the normal L. O. A. It becomes well flexed and then descends, rotating until the sagittal suture lies in the median line. But with this important difference: that the occiput is directly behind, and the forehead in front. Therefore, when the head has reached the inferior strait, it cannot sweep over the perineum by a movement of extension, as in the L. O. A., but must be pushed on firmly flexed, and dragging the shoulders immediately after it. This greatly distends the perineum and increases the risk of laceration. It is also a well-known clinical fact that it requires much more powerful contractions and a longer time to expel a head with the occiput posteriorly than in front. Where there is a close fit between the head and pelvis, it cannot be accomplished without instrumental aid.

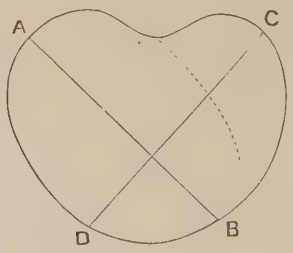
2. The head may proceed as in the first mechanism until it reaches the inferior strait, or the level of the

[1] It will be of great benefit for the reader to illustrate the account with a pelvis and fœtal skull.

ischial spines. Then, after some delay, and the most complete flexion, it rotates completely around until the occiput is in front, commonly advancing during the latter part of the rotation, and then emerges with the occiput in front, as in an originally occipito-anterior position.

3. It may proceed, as in the first mechanism, until it has greatly distended the perineum, the occiput being still behind, when, rather suddenly, the head whirls around with the occiput in front, and emerges as an occipito-anterior position. This singular and exceptional mechanism (I have seen it occur half a dozen times) gives us the clew to the reason for anterior rotation in any case, as will be presently noted.

FIG. 9.



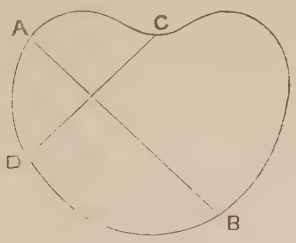
The outline of the inlet.

A B. The right oblique diameter.
C D. The left oblique diameter.
The dotted line completes the outline occupied by the head.

4. The head, while still at the brim of the pelvis, rotates, with the occiput in front and to the right, being thus converted into a second (R. O. A.) position.

The reasons for anterior rotation of the occiput at these different levels are as follows: In the normal (L. O. A.) position the head enters the pelvic inlet in such wise that its long antero-posterior diameter lies in the right oblique diameter (A B, Fig. 9) of the pelvis; while its largest transverse diameter, the biparietal, lies in the left oblique diameter C D. This is because the biparietal diameter is not in the centre of the head, but crosses behind the central point. In like manner the foramen magnum is placed be-

Fig. 10.



The outline of the inlet.

A B The right oblique diameter.

C D. The chord of the right sacro-iliac arch, over which the shoulders fall in the R. O. P. position.

hind the centre of the skull, and this implies that the neck and shoulders, in following the head through the pelvis, will follow behind the middle point of the head. The shoulders then will follow the head, with their long diameter in the line C D, the most commodious part of the pelvis.

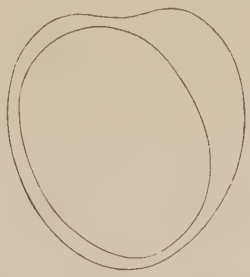
In the occipito-posterior position this is materially changed. The long antero-posterior diameter of the head lies in the right oblique diameter of the pelvis,

A B in Fig. 10; but the biparietal diameter is thrown over the chord of the right sacro-iliac arch (C D, Fig. 10). In like manner the shoulders, instead of being in the front and roomy part of the pelvis, are brought about behind, to the right of the vertebral column of the mother, and pressed more directly against it. There is therefore a tendency to anterior rotation at once. From the promontory of the sacrum to the centre of the ileo-pectineal line, there is quite a descending plane, and the uterine contractions tend to slide the head along the line and thus turn the occiput in front. Also the uterine contractions, in pressing the shoulders against the vertebral column, tend to make them glide to the right, bringing the back of the child in front. There will be, therefore, an increasing tendency to rotate with the occiput in front. If by the time the head has passed the inferior strait and cleared the pelvic bones it is still unrotated, the neck will have become so twisted that the untwisting force of its elastic tissues will with considerable rapidity twirl the head around and complete the anterior rotation. This may be impossible while the head is in the pelvis, unless it can be extremely flexed, and until its outline becomes circular instead of elliptical; for the head presents an elliptical outline, unless greatly flexed, and the outline of the pelvic canal is likewise elliptical; and a close-fitting ellipse cannot be turned within a similar outline (Fig. 11).

Anterior rotation will, however, become an impossibility, if the shoulders are not deflected from the vertebral column so as to bring the child's back in front. Should the back remain behind facing

the mother's back, anterior rotation cannot occur without breaking the child's neck. Therefore, in any case where we discover an occipito-posterior position, our duty is plain. We should endeavor to map out the position of the shoulders by abdominal palpation, and should then secure their movement so as to bring the child's back in front. If we succeed, there is a reasonable certainty that anterior

FIG. 11.



The outline of the pelvic cavity, half way between the straits. The inner outline shows the close fit of the head and the difficulty of rotation until the outline is made circular by rotation.

rotation will sooner or later occur, in time to save the perineum from great danger, if not to prevent delay. There is no objection to a subsequent attempt to rotate the head at the inlet by pressing the fingers in opposite directions against the sutural edges. I have several times succeeded in at least aiding anterior rotation in this manner. But the use of instruments is so generally futile for this purpose, especially when used without a preliminary adjustment of the shoulders, that it is scarcely worth while to attempt rotation with their aid. Whether

we succeed or not in effecting the rotation of the shoulders, great delay may occur in the advance of the head. We may use the forceps at any time after full dilatation of the os, if there has been, or threatens to be, any material delay, but it will be wise to wait a little longer than in the L. O. A. position, other things being equal. The compression of the head by the forceps militates against rotation anteriorly at the inferior strait, and the efforts at assisting rotation, which can scarcely be avoided, are quite as likely to interfere with as to promote the natural proceedings. After waiting a reasonable time, which on the average may be said to be two hours after full dilatation, and with no speedy prospect of a change, we should apply the forceps precisely as in the L. O. A. position. Having applied them, we should grasp the handles with an even gentle pressure, and having taken a firm hold of the head, we should elevate the handles without traction. This will enable us to flex the head thoroughly, which is a great help in extracting it, whether anterior rotation occurs or not. Traction is then to be made as usual in the axis of the pelvis, according to the part of it in which the head is placed. Attempts at forced rotation are to be deprecated; but if in our traction we observe that the head has a marked tendency to rotate, we may aid it with the forceps. When the forceps are used anterior rotation cannot be reckoned on until the head has reached the inferior strait. It may be advisable at this point to remove the forceps to facilitate rotation, and reapply them if necessary after the occiput has turned in front. This is not always necessary, for as the head rotates

it usually advances, and by the time rotation is complete so large a part of the forceps blade is exterior that the part within the vagina is nearly straight, and turning it around will do no harm. When the occiput remains posterior throughout, great care must be exercised in bringing it over the perineum, and unless the operator is sure of his skill, he should remove the forceps at this time, and rely upon manipulation alone for the extrication of the head.

Compression of the head, more than is necessary to maintain the hold of the forceps, should be avoided, not only because of its possible interference with the natural process of rotation, but also because the tips of the blades come in dangerous proximity to the medulla and to the vessels and nerves of the neck. This position is, therefore, dangerous, for the child as well as for the mother, subjecting them to increased risk. Of course, when the head is small it may pass rapidly in almost any manner.

Facial Presentation.—The four positions of the face presentation may, for practical purposes, be considered as two, the mento-anterior and mento-posterior. The first, or *left mento-anterior* (L. M. A.) position corresponds closely to the L. O. A. position of the vertex. The long diameter of the head is placed in the right oblique diameter of the pelvic inlet with the chin in front; and so far as the head alone is concerned, it is simply a reversal of the L. O. A. position, the face coming first, instead of following the occiput. The difference in the result is largely due to the way in which the body follows the head. At first the head descends rotating, the chin coming rapidly to the median line in front, but before the head can quite

reach the perineum the upper part of the chest has been pushed into the pelvis, and its thickness is added to the cervico-bregmatic diameter of the head. Also, the uterine force will be transmitted in front of the head, tending to extend it further and push it backwards while wedging the neck and occiput in the pelvis. Hence a necessary delay. As soon as the head can reach to the perineum, so as to press upon it and be pressed upon in return, it will execute a movement of flexion, which will at once allow it to sweep over the perineum, and be born without further trouble. With a large pelvis or small head, this mechanism is completed with little delay at any point. When the fit between head and pelvis is a little closer, there will probably be a prolonged delay at the inferior strait until the neck is elongated, the head moulded, or the child packed into the pelvis far enough to allow the head to reach to the perineum and undergo the movement of flexion. When there is a close fit, the natural efforts may be incompetent to effect delivery. The effects of delay in this position are decidedly bad for the child. The caput succedaneum, which forms on the presenting part when stationary at any point in the pelvis, here forms upon the face. The eyelids and nostrils may be closed with œdema, and the tender skin of the face is easily abraded under these circumstances. This very deforming swelling may disappear in a few days after birth, but the strain upon the eyes cannot do them any good, at least, and the lips may be swollen so as to prevent suckling. The unnatural extension of the head and the wedging of the neck which accompany delay at the inferior

strait, are additional sources of danger to the child, by altering or even altogether arresting the cervical circulation.

Therefore, while we may allow the natural efforts to proceed unaided as long as they are manifestly advancing the head, we should be impatient of any considerable delay. The manœuvre suggested by Penrose is often of great service. This consists in hastening flexion when the face has reached the inferior strait by pressing upon it with two fingers, in imitation of the action of the perineum and during a uterine contraction. If the face will not reach to the perineum, we may bring the perineum to it, as it were. When manipulation fails we may resort to the forceps, which are to be applied precisely as in a L. O. A. position. As a rule, there is no difficulty in applying the forceps and delivering with ease in this position. The right mento-anterior position differs only in the direction of rotation.

The right mento-posterior position is a much more formidable occurrence. Like the occipito-posterior position, it may terminate in anterior rotation, the chin coming in front. But unlike that position it is absolutely necessary that anterior rotation should occur, for in any ordinary pelvis the face presentation cannot be delivered if the chin remains posterior throughout. Owing to the curvature of the pelvic canal, the posterior part of any presentation moves more rapidly than the anterior. While the forehead remains stationary at the brim the chin descends; but not far, for it can go but a little distance without the entrance of the shoulders into the pelvis. The shoulders are thrown over the chord of the sacro-

iliac arch, and as in the occipito-posterior position may be pushed to one side of the vertebral column, thus aiding the anterior rotation of the head. If anterior rotation does not occur, the parts become more and more tightly wedged in the pelvis. The head is already extended to a dangerous limit, and no further movement of either extension or flexion can advance the head. Assistance in a mento-posterior position is demanded, therefore, both in the interests of the mother and child. We should first endeavor to secure anterior rotation, so as to convert it into a mento-anterior position. The shoulders should first be mapped out by abdominal palpation and the back of the child brought in front, if possible. Not until then will attempts to bring the chin in front by direct manipulation be likely to succeed. If we fail to secure anterior rotation after several efforts, the hand should be introduced into the womb, the head grasped, and an attempt made to convert it into a vertex presentation by bringing down the occiput. This is preferable to podalic version, which is seldom practicable in such a case. The head should be lifted up from the brim by firm pressure, while the fingers slipped over the occiput endeavor to place it in front, and as in an occipito-anterior position. Failing in these manœuvres, we must resort to the forceps, and occasionally firm traction succeeds in effecting anterior rotation. When we find by the turning of the blades that rotation is occurring, it may be best to take off the forceps and reapply them when rotation is complete. Should the forceps fail, we have no resource but craniotomy. This may be resorted to with little

reluctance, since, if the child has been well packed into the pelvis by the uterine contractions or by the forceps, it must have perished from the great pressure upon the neck which this position implies.

The Brow Presentation.—The face presentation is at times produced from the vertex presentation by the arrest of the occiput at some point of the pelvic inlet, while extreme extension of the head brings down the face. By reference to Fig. 10 it is easy to see that, should the biparietal diameter be wedged in the chord of the sacro-iliac arch C D, the anterior part of the head would be very likely to be pushed down by the uterine contractions. Thus a R. O. P. position would be changed to a L. M. A. position. In a comparatively small pelvis this process of conversion of a vertex into a face presentation may be arrested half-way by the wedging of the head in the inlet. When this happens the brow of the child presents centrally and the longest possible diameters are made to engage in the pelvis. This is called a brow presentation, and, as already noted, is not likely to occur in a roomy pelvis or with a small head. It is, therefore, a serious accident, and may impede delivery entirely. The most favorable circumstance is when the process continues until a full face presentation has been developed, or when the head retracing its path is reconverted into a vertex presentation. Otherwise the labor must continue until the uterine efforts have moulded the head into a tall cylinder, usually with destructive effect upon the child besides exhausting the mother. We should, therefore, interfere by converting the presentation into one of the face or vertex, which can often be

done by the hand alone. If not, the forceps are to be applied, and with the head firmly grasped, we will usually have little difficulty in flexing or extending it until we have brought about the desired presentation. The facial is generally to be preferred as more easily effected. Should this fail, we proceed as in the case of the large head or other irremediable obstruction. In this, as in all the positions of the head, skill in manipulative or instrumental assistance is to be obtained by practice, grounded on a thorough knowledge of the normal mechanism; for although we may decline to rely on Nature, we will find that real assistance usually consists in doing what Nature should do but does not.

The Breech Presentation.—Hippocrates was certainly wrong in considering delivery by the breech as impossible, and in recommending the conversion of the breech into the cephalic presentation. The mistakes of the wise are instructive. Hippocrates was not a midwife, but was called only to difficult cases of labor as a surgeon. He therefore noticed more clearly than we do to-day the great proportion of cases in which the breech presentation is attended with serious difficulty: and he who, finding the breech presenting, views the situation with entire complacency, is less wise than the father of medicine.

Many cases of the breech presentation proceed with regularity and dispatch, but an uncomfortably large proportion render labor tedious and difficult. The risks to the child are numerous.

1. The first stage of labor is usually prolonged. The membranes rupture prematurely with greater

frequency than when the vertex presents, and, apart from this accident, the breech does not make an even pressure upon the cervical segment, and is a poor dilating wedge.

2. The soft breech, comparatively larger in outline than the head, has a tendency to spread out over the pelvic inlet, instead of entering it. When the head presents and is pressed towards the inlet, its sutures overlap, and it becomes moulded into a size permitting it to enter the inlet. The breech, if small, may be moulded in like manner, and even more rapidly, by reason of the softness of its structure; but, if large, it is as likely to spread out and become larger as not, thus causing great delay.

3. When the breech once begins to descend in the pelvis, it usually proceeds without further delay until the breech itself is fairly born. But, from the time the breech reaches the perineum, and from that on with increasing force, the funis is compressed between the pelvic walls and the trunk and head of the child. Should delay occur in the delivery of the head, as is very frequently the case in unassisted labor, this compression of the funis will cause asphyxia of the child.

4. Pulmonary respiration, or an attempt at it, may occur, because of the "*besoin de respirer*" being excited by the exposure of a large surface of the body to the air while the head is undelivered. The compression of the funis may have the same effect. The damage resulting from pulmonary respiration before birth is that liquor amnii, vaginal mucus, and other adventitious substances may be inhaled into the bronchial tubes, insuring either present asphyxia or,

should this not be permanent, the development of bronchitis or pneumonia later.

5. As the body descends through the pelvis, the arms may catch on the pelvic inlet and become extended until they lie alongside the head, so increasing its diameter that delivery becomes impossible while they remain in this position.

6. In like manner the head may become extended, and in a pelvis where it is necessary that the head should present its smallest diameters in order to be delivered, may become permanently arrested. It may be noted here that the most conspicuous dangers occur to the child when all but the head has been delivered. The uterus works then at a great disadvantage; indeed, the head may be completely beyond its expulsive grasp, and the whole work of expulsion falls upon the abdominal muscles. And yet the most important and difficult part to be delivered is the head, so that in this respect this presentation is in great contrast with that of the vertex.

7. The perineum is in greater danger of laceration, because the head is usually not well flexed as it emerges, and presents a larger outline to distend the perineum. This is a catalogue of dangers which makes this presentation very undesirable. The statistics of fœtal mortality vary from those of Dubois —1 in 11 stillborn, to those of Collins—1 in 26. It is very doubtful whether, in unaided or unskilfully managed cases, more than two children out of three survive this mode of delivery. It is not necessary to enumerate among the dangers of this presentation the sloughing of the scrotum and other tissues which

become infiltrated with serum after the manner of the caput succedaneum. This implies a continuance of the labor for a longer time than would now be tolerated.

Varieties.—A foot or both feet may present with the breech, and one or both legs may prolapse so that a foot may reach to the vulva before the breech itself has more than entered the pelvic inlet. This does not alter the mechanism materially nor call for a special consideration.

Treatment.—The first assistance in a breech case may be required on account of the long delay in entering the pelvis after full dilatation of the os. When the breech remains above the brim for a long time in spite of good uterine contractions, we may conclude that it is not being properly moulded by the *vis a tergo*, and may assist by traction. The hand being introduced into the vagina (if necessary, to reach far enough), one or two fingers may be placed in the groin of the child, which will allow of quite powerful traction being made. The traction should be made only during a uterine contraction, so that the uterus may hold the arms against the body and prevent their extension. This applies to all traction made before the delivery of the arms and shoulders. In spite of great carefulness, we are apt in making traction to pull a little longer than the uterine contraction lasts, or with too great force, and, after all, find that the arms are extended along the head. For this reason the first rule in the management of a breech presentation is to avoid any traction, if possible, before the shoulders are expelled. When a leg has prolapsed, there is a strong tempta-

tion to grasp it and pull; but this should be resisted, unless the delay in the labor warrants us in incurring the added risk.

Since the traction upon the groin is to be made gently and intermittently, it will be improper to retain the hand in the vagina for a long time. If then we find that we do not promptly secure the advance of the breech, we should substitute for our fingers a fillet. A piece of roller bandage, a silk handkerchief twisted diagonally, or similar contrivance, is to be taken by one end, well greased, and carried over the child's groin, pushing several inches of it onward before stopping. The fingers may then be passed on the inner side of the same thigh until they meet the end of the fillet, which they may then nip between them and withdraw. In this way we obtain a sure hold, and, taking the two ends in one hand, we make traction, deflecting the force by downward pressure upon the band in the vagina, the fingers in the vagina acting as a pulley, and enabling the traction to be made in the proper axis. The end of the fillet may be pushed into the eye of a silver catheter, such as is found in the pocket-case, and in this way more easily carried over the groin. A blunt hook of iron was formerly much used instead of the fillet. It is no more efficient, and almost sure to injure the child by pressure upon the iliac vessels and other tissues. Should these methods fail to advance the breech, the hand should be cautiously passed beside the breech and a leg seized and brought down. This both gives an excellent means of traction and breaks up the wedging and spreading of the breech. Both legs may be

brought down, but one will usually suffice. Traction, to be effective, must be made in the proper axis, and indiscriminate pulling will be of little avail, even when the force used is great. There can be no excuse for the employment of the obstetric forceps upon the breech, since one or other of these methods is sure to succeed, and the forceps are more than likely to bruise and lacerate the child.

We are not often called upon to interfere in these ways or until the breech begins to emerge, and at that time the physician should be on the alert to render immediate assistance at any point should the rest of the child be delayed in its expulsion for a moment. As the breech emerges from the vulva he should carefully note the position of the sacrum and the tendency to rotation. The sacro-anterior positions terminate by rotating the sacrum in front, thus insuring the entrance of the head into the inlet with the occiput anterior. The sacro-posterior positions have a tendency to rotate the sacrum behind, so as to bring the head into the pelvis with the occiput posterior. This should be prevented, since an occipito-posterior position is almost or quite as objectionable in a head-last presentation as when the head comes first. In either event the breech usually sweeps over the perineum with the bis-iliac diameter in the median line, and the sacrum directed squarely to the right or left. As soon as the hips are fairly out or a little sooner, the sacrum begins to rotate to the front or back. It should then be grasped and twisted so as to prevent it from rotating backwards should any such tendency be manifested. When the sacrum is turned in front the occiput cannot

stay behind. This having been secured, the finger or fingers should be introduced into the vagina alongside the body and search made for the arms. If they are extended, the hand must be rapidly passed up until they are found. There is no choice of arms; the first one we reach is to be passed across the face and brought down, and immediately the same process is to be repeated with the other arm. This is not usually attended with much difficulty unless the operator becomes flurried. There is little time to lose, but the proverb, "The more haste the less speed," applies here. The uterine contractions or a little traction now expel the child as far as the neck, and the head remains to be delivered. The physician should hold the child by the legs and pull it over the mother's abdomen. This, with a good uterine contraction and bearing-down effort, may be enough. If not, as he does this he should introduce one or two fingers into the vagina and carry them up to the child's face. If the head is extended, the fingers may greatly aid in flexing it. If not, they may be carried to the child's mouth and a channel between them may thus be formed to carry air to it. The woman should be asked to bear down, and should a competent assistant be present, firm pressure on the hypogastrium will greatly assist the delivery. If there is any delay, the body of the child should now be carried down and back so as to press upon the perineum firmly, stout traction being made. This manœuvre is intended to flex the head as well as to make the traction downwards and in the proper axis. The fingers in the vagina may assist by pressure upon the malar bones of the child

or may be temporarily removed and placed in a forked manner over the neck close to the occiput, in which way quite forcible traction can be made. As soon as this movement has been executed and brief but strong traction made, the body of the child should then be made to describe a circle until it again reaches the mother's abdomen, traction being maintained both by the hand that grasps the legs and the fingers upon the neck or face of the child. If necessary, these movements may be repeated; the body pulled downwards and again circularly upwards, while the other hand works as it finds the greater advantage. Some place the greater reliance upon suprapubic pressure, and should the head be high up, this is probably more effective than even direct traction upon the body. There are not a few teachers who recommend the use of the forceps when the head is delayed, in preference to mere manipulation. The body being pulled well up, the forceps can be introduced past the neck and applied to the head. This is not always an easy procedure, still less can it be done promptly; and the same skill applied to extraction by manipulation will generally give better results. The forceps may be held in reserve as a means of delivery should we fail with the hands, but not used as a measure of choice. Two cautions should be observed during the delivery. When the head begins to press upon the perineum, a very little traction will be sufficient to finish the extraction, and the main attention should be devoted to preventing a laceration of the perineum. Also, while the child will bear a large amount of tractile force, it must be remembered that this has its limits.

The experiments of Duncan show that the neck breaks at about 100 pounds pressure, and the head separates from the body when a force of 120 pounds is reached.

Since the child is very frequently born more or less asphyxiated, this is a proper place to record the means at our disposal for effecting resuscitation. Smart shocks to the skin, such as spanking, dashing water or whiskey upon the chest, and the like, may succeed in developing respirations. Placing the child alternately in hot and cold water is also used. More important is mouth to mouth insufflation. The child's mouth is to be wiped or covered with a thin handkerchief. The physician then applies his mouth to the child's and blows air with moderate force into the lungs. To insure its going into the lungs and not merely distending the stomach, he should not blow with sudden force so as to cause the epiglottis to flap shut, and at the moment of insufflation should press his hand well into the child's epigastrium, in order to prevent the passage of air into the stomach. It may also be necessary to close the nostrils to prevent the escape of air in that direction. Having blown air into the lungs, it should be expelled by compressing the thorax, and these manœuvres should be alternated for some time. The Sylvester method of artificial respiration is also valuable, especially after the child has begun to respire. The faradic current may be useful, but is rarely attainable on short notice. As long as the heart beats, efforts to bring about respiration should be continued, and with some hope of success; children having been restored after three-quarters of an

hour had elapsed without an independent respiration. The child should be kept warm during these efforts, its heat-producing power being but feeble at best.

THE TRANSVERSE PRESENTATION, or cross birth, in common parlance, is the most abnormal of all the presentations. There are, nevertheless, certain spontaneously occurring mechanisms by which it may in some cases be delivered.

1. In premature, dead, or under-sized children, the uterine contractions may force the child through the pelvis *doubled up*. This is incompatible with a live birth, and requires great exertion on the part of the mother.

2. *Spontaneous version* may take place, which will be most concisely described in the words of Denman, who first described it: "After the long-continued action of the uterus, the body is brought into such a compacted state as to receive the full force of every returning action. The body in its doubled state being too large to pass through the pelvis, and the uterus pressing upon its inferior extremities, which are the only parts capable of being moved, they are forced gradually lower, making room as they are pressed down for the reception of some other part into the cavity of the uterus which they have evacuated, till the body turning as it were upon its own axis, the breech of the child is expelled, as in an original presentation of that part." This is, in fact, a continuation of the same process, which from the obliquity of the uterine axis converts a head presentation into a transverse. It requires extremely powerful contractions and other favorable

conditions. It may also occur suddenly. Haynes[1] records a case in which a woman with the head presenting L. O. A., arose to go to the close stool, Finding a great inward commotion she hastened to bed, when the breech and foot were found to present. Delivery was then effected with three pains. It is probable that in such cases the voluntary or reflex movements and struggles of the child assist the mechanism of turning.

3. *Spontaneous evolution* differs from version in this; the upper half of the doubled child remains stationary while the uterine force drives the breech down. The chest comes first to the perineum, then the abdomen, and, finally, the breech. Kuhn[2] records the birth in this manner of a living child weighing $4\frac{1}{2}$ pounds.

Of all these methods there is but one thing to be said. They are in no wise to be expected, and a transverse presentation should be turned by the physician into one of the breech or vertex, as soon as possible. If one is called late to a case and finds that one of these processes is in progress or nearly completed, he may assist it, and thus hasten delivery. But in the great majority of instances version is demanded, and the further discussion of these cases will be continued in the chapter devoted to that operation.

[1] Philada. Med. Times, May 3, 1873.

[2] Schrœder, p. 290.

CHAPTER VIII.

MULTIPLE LABOR AND MONSTROSITIES.

In twin labor there is normally but little change from the usual course. After the expulsion of the first child the uterus takes a rest of a few minutes, and beginning afresh, completes the second delivery with a few contractions. If a third child is present, the contractions are again renewed, and so on, but not *ad infinitum*, for there is no reliable account of more than five children being present in any one pregnancy. The interval between the expulsion of the first and second child may be indefinitely prolonged. Hours may pass by before the uterus repeats the active contractions of labor, and even days or weeks may elapse. There is no dispute concerning the fact that a uterus containing twins may expel one prematurely, and yet carry the other to full term. There is not the same unanimity as to the occurrence of superfœtation. In that case it is supposed that a second ovum may be fecundated and enter the womb, one, two, or three months after the fecundation of the first ovum. The first may be carried to its full term, and the second to its full term, so that as long an interval would elapse between the delivery of the two as between their times of fecundation. In the horse this occurrence is well established,[1] and the denial of well-authenticated

[1] Fleming, Vet. Obstetrics, p. 153.

cases in women is principally due to their conflicting with preconceived theories of ovulation. It is certainly rare, and is mentioned only to illustrate the possibility of long delay between the birth of twins without there being any important disability on the part of the uterus. There is no doubt as to the possibility of superfecundation, or the fecundation of a second ovum within a few hours or days, and this would be sufficient to account for some cases of delayed action in labor. A more practical distinction may be found in the existence or not of separate membranes for each fœtus. When twins are enclosed in a single set of membranes, the second child will usually be expelled quite promptly after the first, but when each has its own membranes, the bag of waters of the second may remain intact until the physician chooses to rupture it, and labor is frequently suspended in such cases for a long time, or until the liquor amnii is evacuated. Uterine inertia is common during the delivery of the first child, due principally to the thinness of the uterine walls. It may continue throughout, but when the womb is partially relieved of its contents and its tissues become condensed, its contractions become more energetic as a rule. All things considered, it is probably best for the physician to complete the delivery within a few hours at least, so as not to subject the woman to the anxiety of a long suspension with its attendant risks of hemorrhage and septicæmia.

Before rupturing the membranes of the second child, a careful diagnosis should be made of the presentation and position, malpositions being very com-

mon in these cases. Sometimes the placenta of the first child, if entirely separate from that of the other, will come away at once, before the second child is born; but usually they come away together after both children are born.

Multiple labors are subject to peculiar complications from the tendency of twins to enter the pelvis simultaneously, which may happen whichever end of each child presents. We may find at the brim at one time two heads, or a head and breech, or two pelvic presentations, or as in a case recorded by Cazeaux, where four feet presented at once during the birth of triplets. This should warn us to take nothing for granted in a twin case, since we cannot know beforehand the number of children.

When both heads attempt to enter the pelvis at once, the case is not so hard to remedy as when one head having made some progress in descent, the other prematurely follows. For in the latter event the nature of the trouble may not be suspected until a long delay has occurred. These accidents are more likely to occur when there is but one amniotic sac and the children are thus brought into close relations with each other. Membranes of great toughness and unyielding character may be a potent factor in causing them. It is readily conceivable that when there is but one amnotic sac and the liquor amnii has been evacuated through a small opening in tough membranes or is present but small in amount, the descent of one child pushing the membranes before it must drag the second child with it as soon as the limit of stretching in the membranes is reached. This occurred in a case to

which I was called by a midwife. One head was born for an hour before my arrival, at which time the second head was found on the pelvic floor and beginning to distend the perineum. The first head was covered with a tense and thick membrane, which had to be divided with scissors. This head was then pulled up against the pubes, and in a few pains the second head was expelled, followed by the rest of the body of the second child. The head of the second child had pressed a groove in the body of the first child, and had flattened its sternum against its vertebral column. The first child was of course stillborn, the second was living and did well. This is the usual course in such cases. The child whose head is first expelled is arrested at that stage from the inability of the shoulders to pass by the second head. The latter receives the uterine force more directly and is gradually pushed on, compressing the comparatively softer tissues of the first child, and is born first, to be followed by the body of the first child. This fact should be considered in rendering assistance. If the second child cannot be promptly delivered by forceps or otherwise, the first child may be lessened in bulk by embryotomy, to give more room for the second one. For the first child is sure to die and prompt delivery will increase the chances of the second one. This accident is not likely to happen when a competent physician is in charge of the case from the beginning, for it can scarcely occur without a delay during the descent of the first head of so great an extent as to demand the use of the forceps and the delivery of the first child before the wedging becomes irremediable. Another form of

obstruction is from "head-locking" proper, though the name applies also to the just mentioned condition. It takes place when one child descending breech first, locks chins, etc., with one which is waiting its turn to escape head first. It occurs when the breech has been delivered and as the head attempts to enter the pelvis, but finds the other head crowding in before it. This drags both heads at once into the pelvic inlet. If small, they may continue to advance, but ordinarily they will remain locked and wedged with increasing tightness until removed by art. The first child is evidently in great peril from compression of the funis and other risks of the breech presentation, and must perish unless speedily extricated. It may be possible to unlock the heads while at or above the brim of the pelvis, if it is undertaken in time. An assistant should hold the body already born out of the way, while the physician endeavors, both by internal manipulation and through the abdominal walls, to dislodge the heads, pushing the second head up and out of the inlet. When the woman is placed in the knee-chest posture, gravity will aid in lifting the heads from the brim. If the first head can be unhooked and brought down the second may follow unaided. When these efforts are unavailing and the uterine contractions are insufficient to deliver, the same general principles are applicable, as in the first form of locking, viz., to remove the first child by embryotomy and then bring down the second head by the forceps. The forceps applied to the second head might possibly succeed in dragging it down without mutilating the first, but as the latter will in any

event be destroyed, it is not well to risk the life of both and the mother's tissues by such a proceeding. The first child may be decapitated and removed, leaving the head in the womb until the second child is born. These are the principal complications of twin labors, and others, if met with, are to be treated according to general principles already laid down.

Monsters.—Monstrosities of various kinds may complicate delivery. Those which exhibit deficiencies of structure, such as acephalous and anencephalous monsters do not, as a rule, offer any obstructions to delivery, but may perplex the physician in making a diagnosis of the case. Neither do those which present simple alterations of structure without enlargement, such as the cyclops. Those which present redundancies or excrescences are to be dealt with as before recommended for obstructive deformity of the child. There remain to be considered double monsters, which offer similar problems at times to those of twin labors.

Double monsters are divided into four classes by Playfair, from whose very practical account the following is condensed:

1. Those in which two nearly separate bodies are united in front to a varying extent by the thorax or abdomen.

2. Those in which the union is nearly back to back by a fusion of the sacrums or lower part of the spinal columns.

3. Those in which the bodies are fused together completely, but the heads are separated; the dicephalous monsters.

4. Those in which the bodies are separate below, but the heads are more or less completely fused together.

To the first class belonged the celebrated Siamese twins. To the second, the only less famous North Carolina sisters. The other kinds are either still-born or very short-lived. Delivery is more easily effected in the first and second class when the pelvic extremities present. Both pelves should come down together; when the bodies are born the feet should be drawn far over the abdomen, so as to bring the heads upon a different level at the inlet, and insure their separate entrance. A large pelvis is essential to a live birth, and extensive mutilation may be required. Barnes recommends that version be performed if the heads present, which is sound advice, if so improbable a circumstance as a correct diagnosis can be predicated. The difficulty in all such cases is less in the treatment than in the diagnosis, which absolutely requires the introduction of the hand into the uterus for exploration; nor is the hand capable of a fine sense of touch when thus cramped. A diagnosis is not likely to be arrived at early, but only after careful and protracted observation, and when a part of the presentation has made a considerable advance. The heads have been reported as coming first without great difficulty. One of the bodies may present and be partly born before the other by the process of spontaneous evolution. This would ordinarily give an opportunity to divide the band of union if necessary. In the third class, one head having descended, the body follows by evolution, and is then followed by the remaining

head. In the fourth class, the mechanism is similar but reversed, and if the heads present the lower extremities must come together. These singular freaks of Nature occur usually in women with large pelves, the back being fitted to the burden. The comparative small size of twins is found also in twin monsters, which are rarely of full size and weight, separately considered. It is wise, therefore, in such cases, to exercise as much patience as is compatible with the well-being of the mother, and to be slow in interfering, especially by destructive operations.

CHAPTER IX.

HEMORRHAGE BEFORE DELIVERY.

Hemorrhage during labor and before the delivery of the child may proceed from a lacerated cervix or rupture of the uterus. If from the former, the head descending soon arrests it; if from the latter, it is but an incident in a terrible complication. Epithelioma of the cervix and other rare conditions, such as uterine varices, are possible sources. Serious hemorrhage is otherwise limited to two conditions:

I. Hemorrhage from a placenta normally implanted and prematurely detached; the so-called accidental hemorrhage.

II. Hemorrhage from the separation of a placenta attached in the neighborhood of the os uteri, called placenta prævia.

I. *Accidental hemorrhage* may be due to external violence, but more commonly is occasioned by irregular uterine contractions, developed perhaps without assignable cause. These contractions detach the placenta in part or altogether, and in thus opening uterine sinuses allow a copious extravasation of blood between the uterus and fœtal membranes. If the liquor amnii has been evacuated, a very large amount of blood may escape into the cavity of the uterus before its capacity to retain it has been exhausted. The blood may find its way speedily to the os uteri and escape visibly, but since the acci-

dent occurs usually in the first stage of labor, the hemorrhage is generally concealed, the blood remaining in the womb. Fortunately it is rare, being one of the most formidable accidents that can be encountered. The symptoms occur suddenly. 1. Collapse is the main symptom, being rapidly developed, partly from the sudden withdrawal of blood in large amount, and partly from shock. 2. Pain is at once complained of, being continuous and of a sharp bursting character. 3. The uterine contractions are suspended, owing principally to the distention of the womb. 4. The abdomen is enlarged; sometimes a tumor may be distinctly localized at the placental site, formed by the clotted blood under the partially adherent placenta. Instead of this we may find a uniform tense enlargement of the abdomen.

The only occurrence for which this is likely to be mistaken is rupture of the uterus. Little if any distinction can be made between the subjective symptoms, unless the hemorrhage is comparatively slight; but in rupture of the womb, when complete and attended by the escape of the child into the peritoneal cavity, we can distinctly feel through the abdominal walls the uterus diminished in size, and separately the irregular mass of the child. Also the rent can be felt *per vaginam*. Where the child has not yet escaped, there will have been at least some recession of the presentation in rupture of the womb. The latter occurs almost invariably in the second stage of labor, the former with equal relative frequency in the first stage. The rarity of the accident accounts for the perfunctory advice commonly given

to begin the treatment by puncture of the membranes, as has been well shown by E. L. Partridge.

The plain indication is to deliver as quickly as possible and to leave as little to Nature as can be helped, since the natural termination is in the death of the mother and child. We do not expect the uterus to deliver the child; we are to do that ourselves by forceps or version, as soon as the os is sufficiently dilated. The puncture of the membranes will allow the womb to contract to better advantage perhaps, but this is an uncertain dependency; and, on the other hand, it is quite certain that, if we allow the liquor amnii to escape, we give just that much more space for the extravasation of blood. A pint of liquor amnii may come away, and it is in cases of hydrops amnii that the accident is most likely to happen; can the patient stand the replacement of this bulk with an additional pint of blood? We should, therefore, be thankful if the membranes are intact, and be careful to preserve them so until full dilatation of the os is attained. This we should promote by the use of Molesworth's or Barnes's dilators, or if the situation is critical and dilators unattainable, by manual dilatation. Then we may rupture the membranes and deliver by forceps or version as quickly as we can. In this way there is a little, not much, but a little hope for the child. If we stand by and placidly give ergot, or in any way expect Nature to remedy her own misdeeds, we will lose child and mother, and reputation.

II. *Placenta Prævia* is the name given to the implantation of the placenta at any point close enough to the os internum to be detached in part during the

process of dilatation. When an impregnated ovum enters the womb, it usually becomes implanted very near to the orifice of the oviduct through which it entered. This is the natural intention, since the uterine cavity is larger above than below, and the placenta will have more room to expand if it is developed in the upper part of the womb. Should, however, the ovum continue its journey to be arrested finally at the narrow os internum, it will there become implanted, and the placenta as it grows will completely cover the os internum. This is known as central placenta prævia, because the placenta, growing evenly in all directions, comes to have its centre practically over the centre of the os. When only a portion of the placenta intrudes upon the os, it is known as lateral placenta prævia. The placenta may be so situated as just to reach to the edge of the os uteri or it may only extend to within an inch or so of the os, making it difficult to draw the line exactly and say where the condition terminates. According to the theory of Barnes, this is very well determined as a line drawn circularly about three inches from the undilated os uteri. If the placenta is situated wholly above this line, it will not be detached during dilatation of the os. If any part of the placenta is within this zone, it will or may be detached, and so is entitled to be called placenta prævia. We will allude again to this important fact of a distinct cervical zone.

A placenta attached to the lower segment of the womb causes no difficulties in the early months of pregnancy, but the situation is essentially unnatural. The womb, though becoming more nearly globular

in enlarging, always remains more commodious in its upper half. This situation of the placenta compels a reversal; the lower segment of the womb must become relatively larger and develop more and faster than it is in its nature to do. If it does not grow the placenta will, for this remarkable organ will grow luxuriantly, even upon the peritoneal covering of the intestines, as in some cases of abdominal pregnancy. The placenta will, therefore, literally outstrip the womb in the matter of growth, and in so doing must grow away from the uterine wall and become at that point detached. Also, at a variable period, but not commonly before the sixth or seventh month, the lower segment of the womb being distended more or less by the rapidly growing placenta, begins to add the cervical cavity to its own territory by pulling open the os internum. This, of course, must happen sooner or later; in placenta prævia it usually occurs long before the proper time. Whether the placenta be centrally implanted or only covers the os by a part of its area, this opening of the os internum unavoidably severs some of the utero-placental connections, and by dislodging some of the placental tufts from the underlying uterine sinuses, permits the escape of blood. The laceration of tissue may be slight, but the hemorrhage is usually sudden and copious. In the great majority of cases the source of hemorrhage is from the uterine sinuses alone, but the fragile placental tissue may also be torn by the dilatation of the cervical area, and some blood be lost from the fœtal circulation directly. When the hemorrhage occurs both mother and child are placed in great danger. If it occurs

at any time before the end of gestation, the freedom with which the blood is poured out tends to dissect up more placental tissue, since blood may escape from the sinuses faster than it can find its way through the os uteri. This condition proves also conservative. The blood being in part retained is clotted and seals up the sinuses. So long as the woman is quiet and the blood pressure is not high, there may be a cessation of hemorrhage for days or weeks. But on exertion or when a menstrual period would otherwise have been due, the increased vascular tension will be likely to precipitate another attack. The effect of a menstrual period is very interesting as showing the existence of a monthly molimen during pregnancy, with every essential element of menstruation, except the hemorrhage and the changes in the mucous membrane of the uterus, which precede menstrual hemorrhage. Anything which causes pelvic hyperæmia may promote the separation of the placenta, and this is found to occur with the greatest frequency at the end of the sixth, seventh, eighth, and ninth months of gestation. Hemorrhage may occur at almost any time of the pregnancy, depending on the accommodating capacity of the womb and other circumstances; but as a rule, it does not begin until about the seventh month of gestation, and when the child is viable. In a small proportion of cases there is no sign that anything unusual exists until the very end of full term and the proper dilatation of the os begins. Still more rarely cases of placenta prævia have terminated without any loss of blood, and without assistance. We are, therefore, practically called to

treat this condition under two circumstances: when hemorrhage occurs prematurely in the latter months of pregnancy, and when it appears as a complication of labor at full term.

When it occurs during labor the hemorrhage continues during the dilatation of the os: each line of increased diameter sundering a corresponding amount of placental attachment. When it occurs prematurely it may precipitate labor, but under ordinary circumstances the hemorrhage is arrested for a time by the sealing of the sinuses by clots and by the inherent contractility of the tissues. In either event a mechanical impediment to dilatation of the cervix exists, in addition to the vital risks incurred. The cervical tissue is enlarged and thickened, owing to the proximity of the placenta, and is less dilatable than under the normal condition. The placenta also acts as a splint bound upon the muscular fibres and binding their retraction and condensation. It is this which makes the condition peculiarly dangerous, since the hemorrhage is due to causes which also tend to prolong the labor and make assistance difficult. It is instructive here, as always, to observe Nature's method of dealing with her own mistakes. When the detachment is premature the hemorrhage is usually arrested by the formation of clots, as already noted. Where the detachment occurs during labor, the uterine contractions tend to separate the placenta and expel it before the child, reversing the usual order of events. If this is accomplished before the hemorrhage proves fatal, it arrests it, and the child may be born without any further trouble, but will of course be dead. Spontaneous detach-

ment of the whole placenta is usually confined to cases of central implantation, in which it may be said to be the rule. In lateral placenta prævia the hemorrhage may be arrested by the escape of the liquor amnii and the wedging of the head and placenta in the pelvic brim, which will require good uterine contractions. In the majority of cases the hemorrhage and shock bring about uterine inertia and the hemorrhage continues until death, without any natural effort at restraint. When the physician is called to a case where profuse hemorrhage has already taken place, and is still continuing, and finds the uterine efforts suspended or feeble, and the os uteri too little dilated to permit a prompt delivery, he is in need of all the coolness and good judgment attainable by him; and, moreover, needs a definite plan of treatment based upon sound principles.

Diagnosis.—The recognition of placenta prævia is rarely attended with any difficulty. The only other conditions in which sudden and profuse hemorrhage may occur early in the labor are accidental hemorrhage and epithelioma of the cervix, an extremely rare condition during pregnancy. The former is attended with much pain, while placenta prævia is painless, or nearly so. In cervical cancer the rim of the os uteri will always be invaded by the morbid growth, while in this condition the os is even and natural except in being a little thicker than usual. If we can insert the finger far enough to feel the placental mass, the diagnosis will be complete, since nothing can be mistaken for placental tissue. It is needful to remember that not in all cases will the

placenta extend over the os uteri, and that we may have sharp hemorrhage from a placenta, the edge only of which is within the cervical zone.

Treatment.—The treatment of placenta prævia may be best discussed by beginning with the occurrence of hemorrhage during labor at full term. It is first to be observed that the labor, supposing it to be normal in all other respects, is complicated in two ways: first, by hemorrhage threatening the life of mother and child; and, second, mechanically, by the attachment of the placenta to the cervical zone, hindering dilatation, and to some extent acting as an obstruction to the advance of the head. If, then, we can get rid of these two complications, the labor will become as nearly normal as the circumstances will admit of. This we can actually accomplish by the method of Barnes, which consists in introducing two fingers within the os uteri and under the placental edge or substance, and in dissecting up the placenta for about three inches in all directions from the os, or, in other words, as far as the fingers will reach, when the hand is in the vagina. It has already been said that there was a cervical zone of about this extent, which was the limit of detachment of the placenta. This is simply because this is the only part of the uterus which is retracted and condensed during the dilatation of the os uteri. Within this limit the fibres retract as the os dilates, and thus cause a separation of the placental tissue. Hemorrhage takes place until the uterine substance has condensed sufficiently to close the sinuses embedded in its structure. If now we at once separate the placenta from this region none of it will be exposed

to further separation; dilatation may proceed without further hindrance from the splint-like placenta, and without any more detachment; and the cervical fibres at once retracting, the *hemorrhage is arrested.* The case may then proceed rapidly or slowly, at the judgment of the physician, the main complications having been removed. There will still be the not always trifling addition in bulk of the placenta to be added to the diameter of the fœtal head, and it is also true that abnormal presentations and positions of the child are common accompaniments of this condition. But the dangerous and vital complications are removed. The certainty with which the hemorrhage is arrested is well-nigh incredible to those who have not tried this method. The following case will illustrate. Mrs. K., fifth pregnancy; a week ago had uterine hemorrhage. Labor began at 6 A. M., with hemorrhage, which continued more or less freely until I was called at 2 P. M. I found a completely central placenta prævia, the os dilated to about one inch in diameter, the pains feeble. The woman was extremely blanched, thirsty, pulse thready and irregular, from 120 pulsations in the minute upwards. Finding it inconvenient to introduce the fingers into the womb, I first inserted a Molesworth dilator, and easily dilated the os to about two and a half inches in diameter. The hand was then introduced into the vagina, and two fingers within the os, which were swept around circularly, detaching the placenta in every direction, and without reaching its edge at any point. The fingers were then pushed onward in the most convenient direction until the edge of the placenta had

been reached, and the membranes were at once punctured. As the liquor amnii escaped the funis prolapsed, and was found to be non-pulsating, which, with other indications, showed the child to be dead, and further efforts on its behalf needless. The hemorrhage having absolutely stopped, the woman was allowed to rest; hot milk and whiskey being administered from time to time. By 7 P. M. the pulse had fallen to 88 beats in the minute, and was of good volume, and the whole expression of the woman had changed for the better. The child being dead, there was no object in delivering the woman in any other way than in that which would be the easiest for her; so the placenta was completely detached and delivered, the head perforated, and the child extracted with ease. If the child had not already died from the repeated hemorrhages before assistance was called, there is no reason why it might not have been saved as well. The mother made a good recovery. The partial detachment here advocated does not at most destroy more than one-third of the respiratory tract of the fœtus, and it can certainly maintain life with the remainder for several hours. We have, therefore, in this method what we cannot secure so well by any other: a means of removing the danger and then allowing time for the woman's strength to rally before subjecting her to further operative procedures.

It is well to have more than one string to our bow, and other manœuvres are undoubtedly useful in some cases, though none is of such universal application as the detachment of the placenta from the cervical zone. Simpson advocated the complete

detachment of the placenta with speedy and forcible delivery, hoping in this way to extract the child before it had been asphyxiated past remedy. This implies a resort to forced dilatation, followed either by the formidable operation of version or the rapid and skilful use of the forceps. I have seen cases where this method would have proved inevitably fatal to the mother, nor is it always practicable. When we add to this that it is not necessary in order to check the hemorrhage, it is plainly seen to be inferior to the method of Barnes. When the child is surely dead, and the entire placenta can be removed without difficulty, there is no objection to getting it out of the way.

The simple puncture of the membranes has also been relied on as a method of checking the hemorrhage. This requires active uterine contractions to be effective, and is by no means certain, even when they are present. It acts by allowing the head to be forced down upon the cervix, and thus compress the placenta. It is a good adjuvant to cervical detachment, but not to be relied on by itself. The forceps are advocated by some, to be applied as soon as the os can be made to admit the blades, after which the head may be made to compress the placenta steadily and exert dilating force. It is sometimes recommended to puncture the placenta centrally by the hand, and having turned the child to drag it through the perforation, and then detach the placenta. This is stupidly unscientific, and scarcely entitled to a place in our list of resources. It is no doubt brilliant to terminate the labor suddenly in this or a similar way. Stop-

ping the hemorrhage, and then allowing a little rest for the recuperation of the maternal energies is prosaic compared with it, but there can be no question as to the comparative results. Should partial detachment fail, and the word impossible is out of date, then we may have to try bolder measures; but the perforation of the placenta must be a very infrequent necessity.

The *tampon* is also much used, and is capable of rendering much service, especially during the attacks of hemorrhage which come on prematurely. It is best applied as follows: Place the woman in Sims's position, and with the Sims's speculum expose the os uteri. A cylindrical or bivalve speculum will do, if one is inexpert with the Sims's. Some cotton batting, soft rags, lampwick, or other similar substance is then to be packed in the vagina. If we have a continuous strip of soft bandage or wicking, the tampon will be easier to take out, but a little more troublesome to apply. Since the uterine efforts may possibly save us the trouble of removing it, it may be as well to use pledgets of cotton, grasped in the hand and made into balls of a size varying from a pigeon's to a hen's egg. A medium sized piece may now be picked by uterine dressing forceps and pushed *into the os*, if it is patulous enough to admit it. Larger pledgets may now be pressed behind the cervix, on each side, and in front, using some force to pack them into place. In this way we may fill up the upper third of the vagina, gradually withdrawing the speculum. If there are no uterine contractions, we need not pack more than the upper third or half of the vagina, but if there is any ex-

pulsive effort, it will be better to continue the packing until we reach the vulva, over which a pad may be applied and kept in place by a T-bandage. A tampon should not ordinarily be left *in situ* for more than twelve hours, after which it should be removed and another one applied after a cleansing injection of hot water. If the upper pledgets are prepared by dusting some iodoform on them, it may be left for several days, as far as any danger of septicæmia is concerned. When applied during labor, a few hours is generally long enough. The first effect of a tampon is to restrain the flow of blood, induce coagulation, and in this way to seal up the vessels. It may be inefficacious because of the force of the blood current, or because it is insecurely applied. It is, therefore, needful to keep a watch upon it lest blood should ooze past the column of cotton and reëstablish the hemorrhage. The second effect of a tampon is to aid in the process of dilatation, principally by reason of its irritant action upon the cervix, awakening the uterus to contract. This does not always happen; the tampon is, therefore, an uncertain dependence in time of labor, so far as advancing its progress is concerned; while, when applied before full term, we cannot be sure that it will not precipitate labor. It should not be applied during labor at full term, after the liquor amnii is evacuated, lest a concealed hemorrhage take place. It is a valuable resource in premature hemorrhage, but during labor a rubber dilator will prove fully as effective in restraining hemorrhage and will dilate the cervix into the bargain. It may be used as a substitute, and with good results.

Statistics are always to be received with caution, yet the following are of interest. In 1861, Read collected 1628 cases of placenta prævia treated by various methods, in which the mortality to the mother was 23.3 per cent. Twenty years later King collected 240 cases, occurring in the State of Indiana, in which the maternal mortality was 22.5 per cent., or substantially the same. In 1864, Barnes found that in 69 cases he had a mortality of 8.5 per cent., the method of detachment from the cervical zone having been employed in all. This may prove only that a very skilful obstetrician does better work than the average practitioner, but I am inclined to think that no one, however skilful, can succeed as well in the treatment of placenta prævia by other methods as he can by that of partial detachment. The mortality of the child is more difficult to ascertain, but under any method is probably not less than 60 per cent. The child usually suffers in health and strength for some time before birth, and even when born alive is commonly feeble and short-lived.

The treatment of placenta prævia, when hemorrhages occur some time before full term, requires the exercise of great judgment. The problem presented for solution will be: How much hemorrhage will mother and child bear with impunity? How long dare we allow pregnancy to continue? If the child is not yet, or doubtfully viable, we should endeavor to prolong gestation until it is presumably able to support existence externally. After that time has come, we should not allow a serious hemorrhage to be repeated. When hemorrhages begin early, the woman should for a time be kept in bed

in the recumbent posture. A tampon may be applied if the flow is profuse; if not, rest in bed will usually suffice. Hot water injections may be used, carefully watching the effects. Whenever we are satisfied that the tendency to bleed is permanent and is not promptly controllable, it will be proper to induce labor. As it is for the interest of both mother and child, as well as for the ease of the physician, that labor should occur as near as possible to full term, there is little danger of this recommendation being acted on rashly. The internal use of hæmostatic drugs, such as gallic and sulphuric acids and the like, is permissible as having a soothing effect on the patient and physician, but little good is likely to result, especially if they are relied on. The hemorrhage is caused mechanically, and needs mechanical means of restraint. Ergot may do positive harm by causing tetanic and unmanageable contractions of the womb, and is extremely unlikely to do any good. Hemorrhage after delivery is very common, because of the abnormal situation of the opened placental sinuses, but the consideration of this, with all other points connected with uterine hemorrhage, will be deferred until the next chapter.

CHAPTER X.

HEMORRHAGE AFTER DELIVERY.

Post-partum hemorrhage, in its typical and usual form, is occasioned by uterine inertia, or a failure of the womb to contract after delivery. It may also be due to the retention of a partially separated placenta, a strip of membrane, clots, or, in other words, to an incomplete evacuation of the uterus. Fibroid and other tumors may be the cause, and, in a less degree, lacerations of the cervix, vagina, or perineum may be followed by hemorrhage. It may also accompany inversion and rupture of the womb. Even when distinct uterine inertia cannot be assigned as the sole cause, it will be due to causes involving some interference with the contractions of the womb, so that the principle will be much the same. When the uterus contracts thoroughly after labor, its interlacing fibres completely close the uterine sinuses. If this were not so, there would be left at the placental site many gaping orifices, some large enough to admit the finger-tip, leading directly into the great venous sinuses, which attain a large development during pregnancy. By the firm tonic contraction and condensation of the womb these sinuses are practically obliterated, so that in some cases not a drachm of blood is lost after the labor. But should the womb become relaxed after the removal of the placenta, blood may gush in a frightful

stream from the placental site, and if allowed to continue, will speedily prove fatal. Such a relaxation is seldom developed later than in an hour after delivery, neither does it often occur immediately. The delivery of the child implies a considerable contractile force in the womb, and in artificial delivery, some temporary contraction is developed by the introduction of the instruments. The uterus does not then remain in a state of inertia after delivery, but the inertia is gradually or suddenly developed. Careful observation will show, however, that the womb was not thoroughly contracted at any time.

The labor may have been easy and satisfactory in every particular; the physician, in a congratulatory mood, is superintending the washing of the child or putting on his overcoat, when the patient complains of dimness of vision, calls for a glass of water, or exhibits some other suggestive symptom. Approaching her, he finds her blanched, faint, with rapid and thready pulse. Suddenly an audible gush of blood is noticed. He lays his hand upon the abdomen and finds the womb soft and expanded, so that it reaches above the umbilicus. The hand introduced into the vagina finds itself immersed in fluid and clotted blood, with which also the womb is filled. In this case the hemorrhage has been concealed. The blood has been pouring out into the womb, but has been prevented from escaping by clots temporarily closing the os or vagina until the pressure has been too great, and a sudden escape revealed the situation at once. In other cases the blood escapes freely from the beginning, and the

woman will probably call attention to the fact before the hemorrhage has become excessive. In any case we will find the uterus larger than it should be, soft and doughy, instead of the normal stony hardness, and containing a greater or less amount of blood, both fluid and clotted. The symptoms of hemorrhage are also rapidly developed. In some cases a continuous oozing of blood may occur, not copious at any time, but dangerously large in the aggregate. A somewhat complicated case which I witnessed in the practice of Dr. Loving, will serve to illustrate. The woman was in labor of twins, and placenta prævia also existed. After delivery it was found that the uterine walls contained several fibroid tumors. One of these, a submucous fibroid, was situated just above the cervix, and the placenta had been implanted over its surface. The greatly enlarged sinuses in this area were, therefore, surrounded by rigid and uncontractile tissue, and a settled dribbling of blood after delivery threatened the woman's life, until it was arrested by the use of tinct. iodinii. Fibroid tumors do not always cause hemorrhage, especially when subperitoneal in character. The bleeding from a laceration anywhere in the genitals may be quite brisk for a time, but generally subsides spontaneously, or may be arrested by simple means.

The amount of blood which may be said to constitute post-partum hemorrhage is hard to define, and may best be stated as an amount necessary to produce ill result. There is much individual difference in women as to the normal amount of blood lost. I have attended a woman in five consecutive

labors, who invariably loses between a pint and quart of blood just after labor, yet always does well, and is a remarkably healthy and robust woman. This is unusual, a few ounces being the average loss consistent with well-being. The beginner is very apt to over-estimate the amount of effused blood, and to mistake a physiological flow for a dangerous accident. His own trepidation may be imparted to the mother, and thus there may be a case evolved when it was not demanded by the original condition. A little blood makes a great show. On the other hand, he should never be indifferent to a flow of blood after labor, nor should he leave the case until the womb is of stony hardness.

Treatment. — The preventive treatment of post-partum hemorrhage is most important. Those who use the method of Credè will see very little of it in their own practice. The firm contraction which this brings about is permanent, except under rare and entirely abnormal circumstances. I have observed a single case of hemorrhage due not to this method, but to the rash enthusiasm of the operator. The patient was a young primipara, who had been happily delivered without accident. The placenta was expelled from the vulva with some force by the method of Credè, and in a few moments a copious stream of blood was poured forth. The uterus was found to be apparently firmly contracted, and low down; in fact, too low down, having been wedged into the pelvis by the downward pressure used in expelling the placenta. A little upward pressure was made *per vaginam*, and the uterus ascended until its fundus reached to the umbilicus. At once the

hemorrhage ceased, the pressure having been taken from the uterine veins. This is not to be charged to the method, which is certainly capable of banishing post-partum hemorrhages from our list of accidents, except where uterine contraction is not in itself capable of arresting the flow.

The curative treatment may be summed up in these points:

1. Empty the uterus.
2. Cause the uterus to contract.
3. If this cannot be done, seal up the bleeding orifices with hæmostatic injections.
4. Support the strength of the woman.

The first indication is to empty the womb, whether its contents are merely blood or the retained placenta, in order to facilitate its contraction and condensation. This is done by passing the hand within the womb and scooping out its contents or detaching and removing the after-birth if still present.

The second indication in time, but first in importance, is to excite and maintain uterine contractions, as the only sure and efficient way of controlling the hemorrhage. This may be first attempted by manipulation, one hand being within the womb and stroking its walls, while the other hand may be placed on the abdomen and assist with friction, kneading, and pressure upon the womb externally. In a favorable case, this will excite the contractions, the womb will squeeze the hand within until it has lost sensation, and finally expel it. This will not succeed in a serious case, the womb requiring a more decided stimulus. We may next take our

choice of several remedies; if one is not at hand, another will be.

Vinegar is usually the most attainable, and is of great value. A clean handkerchief soaked in vinegar may be carried loosely in the hand into the womb, and there squeezed so as to allow the fluid to escape. This may be repeated several times. The vinegar may also be injected into the womb by a fountain syringe. A *lemon*, with the rind removed, may be carried into the uterus, and compressed so as to allow the juice to bathe the uterine surface. A lump of *ice* as large as a hen's egg may be carried into the womb and allowed to melt *in situ*.

Heat and cold are the extremes which are said to meet.

Hot water is as efficacious as ice, and is not so depressing, requiring no reaction after its use. It should be used of the temperature 110° to 120° F., the practical test being that the hand can just tolerate being immersed in it. If the os uteri is kept open so that the water can get out as freely as it goes in, there is little risk in using it, carrying the nozzle of the syringe well into the womb. I have seen a completely relaxed and flabby uterus spring into firm contraction under the stimulus of the hot douche. Dr. I. E. Taylor's method of slapping the abdomen with a towel wet in cold water, may also aid. But unless all the above remedies are absent, it is not wise to pour water upon the abdomen from a height, as has sometimes been recommended. Where there is but a slight tendency to uterine relaxation, the hand made cold by dipping it in water, or in winter by placing it upon a window pane, may succeed in

developing firm contractions. The faradic current has proved itself useful in some hands. Both poles may be placed on the abdomen, or better, one on the back over the uterine nerve centre, and the other carried into the womb. It is very well to use a battery if one is at hand and in working order, but no predilection in its favor should cause us to waste any time in waiting for what is at present a very imperfect and uncertain piece of mechanism.

The various remedies here catalogued, and there is no need to increase the list, may possibly be used in vain. Unless the hemorrhage is comparatively moderate and the mother's condition satisfactory, it is not well to rely too much upon them unless the hemorrhage is speedily controlled. In a serious case we may proceed to fulfil the third indication by injecting a hæmostatic solution, which will seal the bleeding vessels by thrombosis. For this purpose the best agent is the tincture of iodine, diluted one-half with water or even with the full strength of the officinal tincture if necessary. This has also the advantage of being a powerful irritant, which often compels the womb to contract when other means have failed. It is also a trustworthy hæmostatic, producing clots in the mouths of the sinuses at the placental site. Iodine is also a good antiseptic and the clots which it causes do not putrefy and bring about troubles which may attend the presence of coagula formed in other ways. It is not necessary to inject more than two or three ounces of the diluted tincture, the nozzle of the syringe being carried well up to the uterine fundus. This may be repeated, and if more dilute solutions are used, will require to be; but it

the dilution is only one-half, the effect is usually all that could be desired. The solution of the perchloride or persulphate of iron has also been used in like manner, and there is no doubt as to its primary efficacy. But the clots which are formed are nasty and putrescible. Thrombosis of the uterine sinuses is not a condition in itself desirable and we run a risk of septic and inflammatory diseases when it occurs. These risks are reduced to the minimum by the use of iodine, which cannot be said of the salts of iron. It is scarcely too much to say that every case of post-partum hemorrhage can be arrested by the intrauterine injection of tincture of iodine.

Besides these direct means of treatment we may assist in other ways. Drugs are of little benefit. The stomach like the uterus is flabby and does its work poorly. Ergot should be of service here if ever, yet the general testimony is so full as to its want of action that I should earnestly dissuade any one from relying on it. Let the ergot be given if there is time to measure it out, but let the physician stop the hemorrhage in other ways. Opium in the form of laudanum or paregoric may be given in moderate doses as a stimulant, especially if the woman exhibits much mental disturbance and seems anxious.

More important is the administration of hot milk, as hot as can be swallowed, in moderate amounts given frequently. This will rally the stomach as nothing else will, and has also a favorable effect upon the womb. Where the prostration is great, whiskey may be added, but not with too free a hand. If milk is not promptly attainable, hot tea

or even hot water will be of some use, but hot milk is a near approach to blood and more directly supplies the loss to which the woman has been subjected. Where fainting occurs or other symptoms of cerebral anæmia, it is well to elevate the foot of the bed by placing blocks under the lower bed castors, and to take all pillows from beneath the woman's head, so as to hinder the flow of blood from the upper part of the body. Some service may be rendered by applying a bandage tightly around each thigh and arm. A store of blood is thus retained in each extremity, which may serve as a reservoir to be tapped in case of need by taking off one or more of the bandages. This will scarcely be needed when the womb can be made to contract, but may be of use in other cases. Pressure upon the abdominal aorta by a tourniquet or otherwise is a plausible remedy. Such pressure will be more or less imperfect, and any good effect in stopping the blood current will be counterbalanced by the fact that compression of the aorta has been shown experimentally to stop existing uterine contractions. It will be seen that we have a wide choice of remedies, some of which will always be on hand. Confusion may be prevented by keeping in mind the object to be attained. We give or do this or that not as a charm for hemorrhage, but in order to contract the uterus, to coagulate blood, to sustain the woman's strength. So certain is our control in these matters that a death from post-partum hemorrhage, occurring under the supervision of a physician, must compel him to remorseful thoughts. We

may very easily be called too late to a case which we have not superintended from the start.

In fatal cases the woman becomes waxy pale with dilated pupils; restless, the pulse very frequent, irregular, and finally imperceptible; respiration is impeded by engorgement of the lungs, loud mucous râles being audible at some distance; a muttering delirium may be present and occasionally convulsions terminate the scene. If the hemorrhage is arrested before the development of these symptoms, even when the immediate prostration is considerable, it is surprising how rapidly convalescence is reached. I have seen cases in which several pints of blood have been lost and within the month the woman was as well as ever. It is well to remember this tendency before resorting to such extreme remedies for the effects of hemorrhage as transfusion. The transfusion of blood or other fluid, as ordinarily practised, is a dangerous device. The heart is weak, and the sudden filling of the right auricle, which is inseparable from the usual method, tends further to paralyze it. If the case is sufficiently desperate to need the remedy, the engorged lungs will be ill able to stand further influx of blood, and death has been plainly hastened in this way, as I have myself witnessed. If the blood is not introduced rapidly or if thrown into the arterial current, the process will be too slow to do any material good, and arterial injection has other drawbacks. With the present status of the operation it appears probable that if the patient is able to endure the operation, she does not need it, and if she does need it, she is too weak to bear it. If a plan can be devised by which blood

can be thrown into the circulation without paralyzing the heart or drowning the lungs, the operation will be a useful if not indispensable addition to our resources. Otherwise it appears to better advantage in dramatic situations in novels. Perhaps we already possess the desired method in the hypodermic injections of normal salt solution, as recommended by Samuel, for the collapse of cholera. The hypodermic injection of whiskey and ether has already proved of value, and it is possible that enough fluid can be thus injected to maintain a flickering circulation, and determine the issue between life and death. The solution recommended contains six parts of sodium chloride and one of sodium carbonate in 1000 parts of distilled water, heated to the temperature of the body. This is to be injected into the subcutaneous tissue, especially on the upper part of the chest, being taken thence into the circulation with a rapidity greater than might, *à priori*, be supposed.

After a hemorrhage the woman is to be kept in complete rest. Under ordinary circumstances it is well to put the child to the breast soon after delivery, but this may prove too much of an exertion. Especially is it to be avoided when whiskey or opium have been administered, since these find their way into the lacteal secretion with celerity, and are capable of doing the child great harm. The patient is in greater danger of septic and inflammatory troubles after hemorrhage, but with cleanliness, rest, and good nursing, she is likely to make a prompt and complete recovery.

Secondary hemorrhage is a term applicable to hemorrhage occurring during the puerperal period, at any time from a few hours after labor to several weeks after. The cause may be a return of uterine inertia, but this is infrequent; when the womb once contracts fully after labor, it rarely becomes relaxed again. The detachment of thrombi from the orifices of the uterine sinuses may cause it, especially when the womb has remained uncontracted. The retention of pieces of placenta, or of the membranes, or the presence of a large clot, may cause hemorrhage at the time of their expulsion, or a continuous oozing for some time before. Where a small clot imperfectly closes a sinus, blood may slowly trickle past, coagulating in thin layers until a stalactitic mass is formed, resembling a polypus. A bit of membrane or placenta may form the nucleus of such a mass. This is the so-called fibrinous polypus. The uterine mucous membrane, either the decidua vera or serotina sometimes becomes inflamed or deeply congested in patches during gestation. This may by hypertrophic growth lead to the formation of a thickened mass of mucous membrane, which may become detached after delivery with much hemorrhage. In two cases which I have seen[1] the detachment occurred on the twelfth day after labor.

Flexion or version of the womb may occasion hemorrhage, by dragging upon the uterine veins and abstracting the return of blood from the uterus. Flexions may be easily produced in the softened and enlarged uterus at this time. A tight bandage

[1] Trans. Am. Med. Soc., Aug. 25, 1883.

may displace the womb; leaning forward to nurse the baby is a common cause; sitting up too soon when the womb is heavy and its supports are weak, may provoke it. An impacted rectum is a frequent condition after labor, and produces hemorrhage in the same way. In the latter months of pregnancy the pressure of the womb upon the colon often leads to the retention of large accumulations of fecal matter. After delivery these masses descend, and the rectum may become actually distended with them.

The secondary hemorrhages are rarely so profuse as those occurring soon after delivery, but they may persist until the consequences are serious. The treatment must depend upon the cause, which it is absolutely necessary to ascertain. No measures levelled at hemorrhage in general are likely to succeed, but properly chosen methods will control the flow of blood with certainty.

CHAPTER XI.

PLACENTAL DYSTOCIA: INVERSION AND RUPTURE OF THE WOMB.

There are several conditions which may interfere with the delivery of the placenta. An inflammation of the placenta or decidua serotina may occur during pregnancy, with the effect of fastening the placenta here and there by adhesions, which do not readily break down during the process of detachment in the third stage of labor. Such inflammatory adhesions are rare. In the few cases I have seen, the adherent patch was thicker and above the level of the surrounding healthy tissue, and of a deeper red color. The condition may be suspected when the woman complains of fixed pains in the uterus during pregnancy. The method of Credè is competent to overcome many, but not all, of these cases. In a case of twin labor, with separate placentas, I succeeded in delivering one placenta by expression, but the second was adherent just above the pubes by a surface two by three inches in extent, and had to be otherwise removed. The proper course in case of adherence is to introduce the hand into the womb, insinuate the fingers under the edge of the placenta, and by a to and fro motion saw through the adhesion and liberate the placenta. Under no circumstances should one clutch the placenta and pull away a part,

expecting to remove it piecemeal. This will assuredly end in a fragment or fragments being retained to putrefy and cause great mischief. The placenta should at all hazards be removed entire if possible. The membrane may also be adherent in places, and if any strips are detached and left behind they should be at once removed. Those who rely upon simple traction upon the funis to deliver the after-birth, may expect to meet not infrequently with adherent placenta, or, rather, with one retained for want of expulsive effort. The placenta may be too large to pass through the os uteri without difficulty. When traction is made upon the cord, and sometimes this is unintentionally done in manipulating the child when there is a rather short cord, the placenta is pulled upon the os centrally, so that it must be folded like an inverted umbrella in order to pass through. With a large placenta and a well-contracted womb, so that the os uteri has become well retracted, this may cause some trouble. Especially will delivery be difficult if some hemorrhage occurs while the placenta lies spread over the os uteri; for the clots forming behind it may prevent its being folded together, and thus still further increase its bulk and the difficulty of extracting it. Should the method of Credè fail to prevent this, or to deliver afterwards, the proper course is to pass the hand up and perforate the placenta in the centre, which enables us to secure a hold by which we can drag it down.

In 1873[1] I described a curious condition under

[1] Philada. Med. Times.

the title of *utero-placental vacuum*. The placenta being detached and traction made upon the cord, the centre of the placenta is pulled away from the uterine wall. At the same time the edges of the placenta remain in contact with the uterus, and if the vagina is patulous, and air enters the passage, a vacuum will be formed under the placenta, so that the harder one pulls the faster the placenta sticks. It resembles the action of the leather sucker with which the boy raises loose bricks from the pavement. When the placenta is perforated it is at once expelled, or may be easily withdrawn. Neither this nor any of the placental complications will be often met with by those who properly deliver the placenta.

When a second ligature has not been applied to the cord, or for other reasons the placenta is not full of blood, but becomes limp and flaccid, it may not be detached with ease either by the uterus or by the hand. In such cases it would be proper to adopt the practice of Cazeaux and inject cold, or better hot, water into the umbilical vein. This both increases the bulk of the placenta and stimulates the uterus to contract.

Irregular contractions of the uterus, commonly known as hour-glass contraction, may greatly hinder the expulsion of the placenta. In this condition the placenta is either grasped by a ring of circular fibres contracting independently, or may be held in a pouch as it were by such a ring situated around the margin of the placenta. It may also be due to the fact that the uterus is in a state of general contraction, except in the fibres under the placental site, which are relaxed. In either case the hand passed

into the womb finds apparently a second os uteri high up, through which the cord may be traced and above which the placenta is situated. The causes of irregular contraction are obscure, but should be ascertained in any case if possible. It is probable that some cases of supposed hour-glass contraction are really instances of tubo-uterine gestation; the placenta being situated in the expanded oviducts while the child has made its way into the uterus. If no removable cause can be detected, it will be proper to administer ether and, passing the hand up to the constricted point, endeavor to crowd in the fingers slowly and gradually. We may thus expand the constriction. The placenta if adherent must, of course, be then detached. There will seldom be need of haste, and as the accident usually happens before the placenta has been detached, there will not be any hemorrhage.

Anomalies of placental structure may at times perplex the physician. The cord is sometimes inserted, or begins, not in the centre of the placenta but at its edge. This is known as the *battledore* placenta, and if it were less rare the practice of pulling upon the cord to deliver the placenta would be less objectionable.

Sometimes the vessels of the funis ramify upon the membranes and are not collected into a single cord for several inches from the placenta. This is known as a *velamentous* insertion of the cord. These eccentricities cannot cause any trouble in delivery, but occasionally the placenta consists of several separate cotyledons instead of being collected into a single disk. One of these is usually much larger

than the others, and of sufficient bulk to be mistaken for the whole placenta, while the outlying cotyledons are small. These are known as *placentæ succenturiatæ*. It is quite possible for one of them to be separated from the membranes and remain in the uterus, to give rise thereafter to hemorrhage and septic infection. The occurrence is extremely rare, and is important rather in a medico-legal way than otherwise.

Inversion.—During and just after the third stage of labor the womb is subject to a singular accident: it may turn itself inside out. This is known as inversion of the uterus. It cannot occur until after the child is expelled, though the presence of the placenta may be an aid to its occurrence. It is principally caused by irregular contractions of the womb. If a patch of uterine tissue near the fundus remains flabby and uncontracting, while the surrounding fibres are roused to action, it will be depressed below the level of the outer uterine surface, forming a dimple of greater or less extent. This will be due to a localized paralysis of the depressed area which may be transient. With the next general contraction the affected area may act with the rest of the uterine muscle and the process be thus spontaneously arrested. On the other hand, if the inertia persists the dimple grows gradually a little deeper and the tendency of each contraction will be to diminish further the blood supply of the depressed segment, and thus increase its flaccidity. The weight of the placenta clinging to such a lax area may furnish the proximate cause of the depression, but it may happen even after the complete emptying of the

womb and in an entirely spontaneous manner. Pulling upon the partly attached placenta by means of the umbilical cord is an undoubted cause, but unless the uterine tissue is in the abnormal condition just described, no amount of force applied in that way could possibly invert the womb. A physician is not, therefore, necessarily to be blamed for its occurrence, yet it is doubtful whether it can take place when the placenta is Credèd.

When the inversion is once well started, the process continues until the inner surface of the fundus uteri appears at the os. With the next contraction it may be expelled through the os and appear at the vulva or even be extruded completely through it. Its occurrence is commonly announced by the patient complaining of a severe dragging pain, accompanied by a sensation of something having given way inside, and by a profuse hemorrhage. On placing the hand upon the abdomen the physician will be unable to find the womb at all, and on introducing a finger into the vagina or even in the vulvar rim, he will find a globular tumor, which is the inverted womb. If completely inverted, it may protrude more or less from the vulva, and the sense of sight may be added to that of touch for diagnostic purposes. If but partially inverted, the examining finger may find the fundus at the os uteri and the hand upon the abdomen will notice a cup-shaped depression in the womb instead of the natural rounded surface. The "feel" of an inverted womb is quite characteristic, it being doughy, semi-elastic, and of a velvety smoothness. It is somewhat different if the placenta is still attached, in which case the large vessels may

be felt ramifying under the smooth amniotic layer, which gives to the placenta a corded and beaded feeling. It may be mistaken for a fibroid tumor at first, but a moment's reflection will show that a tumor of this size could not occupy the passage through which a child has just been propelled.

The immediate danger is from the copious hemorrhage which is likely to take place. The contingent danger is the permanence of the inversion with all the inconveniences which are implied in such a condition.

Treatment.—The first indication is to detach the placenta if it is attached; the second, to reduce the inversion. When the latter is incomplete the placenta may be so folded with the womb as to make it necessary to reverse the order of proceeding, and first replace the inversion. Some portion of the placental margin will usually be found to be loosened, and beginning at that point it should carefully be peeled or sawn off by the fingers. The reinversion may be accomplished by imitating the process by which it was inverted. One hand should be firmly pressed against the most prominent part of the inverted fundus, so as to indent it if possible by the fingers drawn together in a cone and the tips applied to the womb. It is said that pressure over one of the uterine cornua, or at the entrance of an oviduct, will be more successful than at any other point. The knuckles may also be used to indent it. The pressure should be firm and steady, so as to tire the uterine muscle into bending beneath it. The other hand, or that of an assistant, should be placed upon the abdomen, and pressed down into the funnel-like

cavity, which the departure of the uterine body through the cervix has left. Otherwise the pressure upon the womb from below would force upwards the entire womb and vagina instead of forcing the fundus through the cervix. The fingers as a cone may be pushed into the cervical opening from above through the abdominal walls, and by expanding may stretch its fibres so as to make more room for the return of the fundus. This is of doubtful value, the fingers being too weak, and simple counter-pressure from above to steady the cervix is enough to attempt. When an assistant can be had, his two hands can make not only firm downward pressure upon the cervix, but by a divaricating pressure may aid in its expansion. The mass in the vagina may occasionally be grasped in the hand and squeezed so as to diminish its bulk. At the same time we may attempt to force up that part of the womb which descended last, as in the hernial taxis. This we do by pushing up the womb while grasping it firmly near the constricting rim of the cervix. This may be alternated with the dimpling pressure, for sometimes one method succeeds better than the other. These manipulations are to be kept up perseveringly until the womb yields, or we are convinced that further efforts will do harm. The longer its return is delayed, the more difficult and dangerous the reduction becomes. When a depression has once been gained, the womb will, as a rule, soon yield. The latter part of the return is often sudden, taking place with a snap, which is quite perceptible, if not audible, as some aver. After the complete reduction of the inversion the hand which has followed

the retreating fundus through the cervix should be retained in the uterine cavity for some time, or until it is spontaneously expelled, since the tendency to a return of the accident immediately after the withdrawal of the hand is quite great, if the uterine fibre has remained lax.

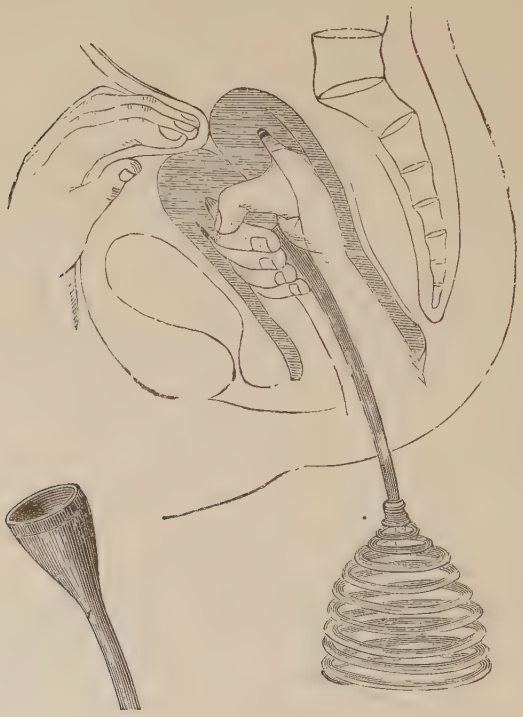
After reposition absolute quiet should be enjoined with maintenance of the recumbent posture, and the catheter should be used to empty the bladder for several days. In a case to which I was called to assist in replacing an inverted uterus, within two hours of its occurrence, the reposition was effected easily, and the woman did well for twenty-four hours after. She then sat up in bed and strained considerably in an effort to evacuate the bladder and bowels. This resulted in a return of the inversion, which the physician in attendance readily replaced, after which there was no further trouble. A return so long afterwards is very rare, and not likely to occur without forcible tenesmic efforts, which may usually be guarded against. When reposition is undertaken immediately after the occurrence of inversion it will not ordinarily be very difficult. If delayed even for several hours it may become a very laborious task. The difficulty which attends delay is due to the firm contraction of the cervical fibres, and the increasing closeness of the grip with which they contract upon the enclosed tissues. This has a compensating feature in that it diminishes the risk of hemorrhage. To relax this grip in order to push back the fundus, ether may be given, and should be tried whenever the cervical rigidity is obstinate.

The possibility of a failure to restore the inversion

must be faced. We should remember the rule, that our efforts to relieve must not in themselves be fraught with more danger than inaction. The use of force is to be avoided. When reasonable efforts fail to restore the womb, whether it be due to the delay which has transpired, or to a want of skill, it is better to abandon the attempt without a resort to any violent measures so likely to be undertaken by one who is baffled and desperate. In case of failure the fundus should be painted with tinct. iodinii, either full strength, or one-half or one-third diluted, according to the risk of hemorrhage. It may then be replaced within the vagina, and kept within by a vulvar pad and a bandage. We should then wait until the period of involution is over, or about two months after delivery, when the womb will have become reduced in bulk, and its tissues less soft and less likely to be torn. The womb may then be replaced, either gradually, by Wing's method, or at a single sitting, by the method of White. In the former, a soft rubber pessary or ball is placed against the fundus, and against this the end of a cylindrical stick, several inches in length, is applied. This may be made, and has been, of a broomstick. On the other end of the stick has been tacked a piece of rubber tubing, of such length that its two ends may be brought up to the level of an abdominal bandage, one in front, the other behind, and there confined with safety pins. The rubber may be put on the stretch, much or little, according to the pain caused, and by its constant elastic pressure it gradually returns the fundus to its place. The repositor of White works on the same principle, but more power-

fully. It consists "of a stem of wood or hard rubber curved so as to conform to the vaginal curvature, with a coil of steel wire attached to the outer extremity, whilst the other end is expanded and hollowed so as to receive the fundus of the uterus in

Fig. 12.



White's repositor.

its concavity or disk. The edge of this disk is tipped with soft rubber, being an inch and three-eighths in diameter, and about half an inch deep." (Fig. 12.) This is used by pressing against the coil,

which is placed on the breast of the operator, while an assistant makes counter-pressure above. Reposition may be expected in from a half hour to two hours, and cases have been reduced when the inversion was of twenty years' standing.

Rupture of the uterus is one of the most appalling accidents that can happen during labor. It may be caused by violence, as in the operation of version, but it is more often spontaneous, occurring when there is a disproportion between the size of the pelvis and of the presenting part. It has been recorded as occurring during labor prematurely brought on, even in the early months of gestation, but most frequently occurs in labor at full term, and when the os has become nearly if not quite dilated. To understand this complication, it is necessary to recall some facts concerning the normal action of the parts involved. The cervix and lower segment of the uterus do not increase in thickness during pregnancy as much as the middle and upper part of the uterine wall. The cervical part of the womb is, therefore, thinner than the part above, the point where the uterine wall becomes thicker being sometimes quite abruptly defined. This results in an apparent muscular ridge circularly traversing the womb several inches above the os internum. It is below this, in the thin part of the womb, that ruptures begin, but a still further thinning is required. If during labor the head becomes packed in the pelvic inlet, meeting with too much resistance to allow it to advance, it holds the cervix against the pelvic walls during each contraction. This elongates and makes more thin the already thin lower

segment of the womb. This is especially the case with the anterior portion of the womb, the pubic segment of Hart. This is naturally pulled up during labor, the posterior or sacral portion being pushed down by the advancing head. If prevented from being pulled up by reason of the head wedging it against the pelvic bones, it will become stretched more and more with each contraction. If this process is long continued, the thinned tissue at length gives way, and when a rent is once started it is speedily extended until large enough to allow the child to be pushed through it into the abdominal cavity. This is not a complete explanation of the cause of rupture, because all ruptures do not begin in front. But if to the foregoing factors we add irregular contractions of the uterus, it is evident that the rent may occur in any part of the thinned lower segment, and this comports with the clinical facts. The most important factors in its etiology are, the existence of disproportion between head and pelvis, and the thinning of the cervix by arrest of the normal retraction of the anterior segment. But with irregular and tetanic contractions, rupture may be brought about from so comparatively slight a resistance as the undilated os uteri. Rupture sometimes occurs as an extension of a laceration of the cervix made by the sudden passage of the head through an unprepared os. It is more often found where the labor is long delayed, yet it may occur when the contractions have not continued very long. I have witnessed its occurrence in only four and a half hours from the beginning of labor, but the os had been completely dilated for some time.

The occurrence is usually preceded by restlessness on the part of the woman. The pains appear to be more severe than ordinary, and the bearing-down efforts are intense and protracted. Whenever this state of affairs is observed without prompt effect on the progress of the case, let the physician beware. Suddenly a sensation of inward commotion is experienced, the pains cease, and in their place is a continuous and terrible cramp-like pain. A condition of shock is more or less rapidly developed, the pulse growing frequent and wiry. The shape of the abdomen changes, becoming broader and flattened. On palpation, the fœtal parts may be recognized with great distinctness through the abdominal walls, and the uterine globe will be found greatly lessened and retracted. On vaginal examination the presenting part is generally found to have receded, and in its place the finger may encounter another part of the child, the placenta, or a coil of intestine, the child having altogether disappeared into the recesses beyond. The rent is then readily felt by the finger, and its extent determined. If the child has escaped completely into the abdominal cavity, some blood will escape from the vagina as a corroborative sign, otherwise the hemorrhage may be internal and concealed. The shock, which sooner or later is always present, is largely due to the loss of blood, and may, therefore, be delayed when the child is not completely expelled, and by its detention in the rent hinders the hemorrhage. It is said that before the rupture takes place the thinning of the lower segment may be distinctly recognized, the edge of the thicker part, or Bandl's ring, being felt as high up

as the umbilicus. The other precursory symptoms are sufficiently threatening, and when the rent has actually occurred, there can be no doubt as to the nature of the case. In the majority of instances the shock deepens, the hemorrhage continues, and the woman gradually expires, whether delivered or not. If death does not occur as an immediate result, the woman must run the gauntlet of peritonitis and septicæmia.

There are some variations from the foregoing account. The shock and hemorrhage may be so violent that the woman dies almost immediately after the rupture. Again, the child may be spontaneously delivered, and the rent may not be discovered until after its birth, when the train of symptoms will be equally suggestive of post-partum flooding until the rent is found. The pain of rupture, which is severe and continuous, will be the first element in a differential diagnosis, and the introduction of the hand into the vagina or uterus will furnish all other needed evidence. Owing to the comparatively loose attachment of the peritoneum covering the womb, the rent may extend only through the muscular structure of the womb, stopping short of the peritoneum. This will alter and mitigate all of the symptoms, but it is a very rare accident.

The mortality of rupture is capable of being lessened by treatment. Of cases abandoned to Nature very few recover, nor is the chance of recovery greatly increased by extracting the child through the rent. The general mortality may be fairly stated at about 90 per cent. But when gastrotomy is performed, there is a saving of from 20 to 30 per cent.,

as shown by the valuable statistics of R. P. Harris. The reason is obvious. The child is not all that escapes into the abdominal cavity. Blood and liquor amnii, meconium, vernix caseosa, and the like débris, flow into the peritoneal sac, and no drainage can possibly remove them. It is just as important that these should be removed as it is to extract the child, and for this purpose the abdomen must be opened. We can then be made secure also against further hemorrhage by applying sutures to the rent. When the child is removed in this way, the "toilet of the peritoneum" made, and the laceration closed, the condition of the woman may be little worse than after an ovariotomy. There will be of course cases where the shock and hemorrhage make a fatal termination inevitable, and the woman may expire during the operation, but one may be sure in such event that she would never have survived the tremendous risks which are a necessary sequence of the accident. It is because of this great saving of life which has been demonstrated to follow the operation of gastrotomy, that it is doubtful whether the child should ever be delivered *per vias naturales* after rupture. The accident happens with greatest frequency in the ignorant classes; among those who cannot be made to see the importance of any operation after the child is actually delivered. It is, therefore, better to run no risk of refusal, and to insist on the operation as a means of delivering the child.

Should circumstances make it expedient to extract the child by the vagina, it is usually feasible and not particularly difficult. Since the rent occurs in the lower segment, and with the head presenting

in most cases, the child in making its exit is usually turned so that the legs or feet will be found near the rent, and the child may be easily grasped and delivered if it is attempted promptly after the occurrence of the accident. If some time has elapsed, the retraction and condensation of the uterus may make it impossible to deliver in this way, and the child is sometimes so placed in the abdomen that its seizure becomes difficult. The placenta is almost invariably detached as the child escapes through the rent, and the latter will be still-born, however quickly delivered. There is, therefore, no need of considering it in any project of delivery. Rupture may occur from an attempt at version, as it is conceivable that an ignorant and forcible application of the forceps may have the same result. The treatment should be the same whatever the cause.

Lacerations of the cervix alone occur with some frequency. It is the present fashion to attach immense importance to this lesion, but even now there are few advocates of immediate repair. Should the resulting hemorrhage prove uncontrollable, it will be proper to close the rent with sutures, but otherwise it may be left until after the convalescence and until it gives evidence of doing harm. During labor it is proper to apply the forceps promptly after its occurrence, to avert a possible extension of the tear into the structure of the uterine body.

The *vagina* may also be torn, both as an extension of a uterine laceration and independently. The laceration may involve the bladder or rectum, but is usually confined to the vaginal walls. When the forceps are applied obliquely upon the head instead

of upon its sides, the edge of one or both blades may lacerate the vagina. The vagina may also be congenitally small and undilatable or have failed to enlarge during pregnancy: its calibre may have become contracted by inflammation. These lacerations are best left alone unless their closure is demanded on account of hemorrhage. Lacerations of the perineum have been sufficiently discussed in a former chapter.

CHAPTER XII.

ECLAMPSIA.

The pregnant and parturient woman is not exempt from any of the convulsive diseases; indeed, her liability is increased. There is one form of eclampsia which is properly denominated "puerperal," since it is evoked only by the conditions present at that time. The typical form occurs during labor, but it may also be developed at any time after the middle period of pregnancy and within a few days after delivery.

Its clinical course will first be considered, having especial reference to its occurrence during labor.

Premonitory Symptoms.—Albuminuria is a very common forerunner, being found in about ninety per cent. of all cases. When a pregnant woman complains of swelled ankles or other manifestations of œdema, the physician should examine the urine and if albumen is found, should at once put her upon appropriate treatment. There is a tendency on the part of women to suffer any bearable condition during pregnancy, under the delusion that relief is impossible until delivery, or that it is improper to take medicine when pregnant. For this reason we are often unaware of the woman's state until summoned to attend her in labor. The great frequency of renal congestion if not inflammation during pregnancy is sufficient warrant for the physi-

cian to institute a careful inquiry into this matter when engaged to attend any one in labor.

Approaching the convulsive seizure the premonitory symptoms usually increase in number. Headache, often intense in character and increased during a uterine contraction, is very commonly present. A headache during labor should never be looked upon with indifference. Some dulness of intellect or apathy with drowsiness may at times be noticed. The patient may complain of flashes of light or blindness, though, as a rule, not until the attack is imminent. During and after a pain the face flushes and the veins of the neck are turgid. The pupils become contracted, strabismus may appear; slight twitching of the facial muscles, not perceptible except to one closely observant, may occur with some cramping in the arms. With the next contraction the eclamptic seizure begins. These premonitory symptoms may be mainly or altogether absent, the attack coming as unexpectedly as thunder from a clear sky. They may also occur and pass away harmless, especially when appropriate treatment has been instituted in time. Whether with or without forewarning, the course of the attack is uniform.

Clinical Course.—First occurs a general tonic contraction of the muscles lasting for a minute or less. In a severe attack all the muscles of the body may be implicated. In lighter ones the facial and laryngeal muscles alone may be convulsed, then those of the thorax and upper extremities. This immovable rigidity passes off into irregular clonic spasms of the same muscles, the masseter muscles remaining tonically contracted throughout. The respiratory mus-

cles are greatly affected and the face may become livid from deficient aëration of the blood. The clonic spasms last for several minutes, the duration and violence being usually proportional to the severity of the seizure. They are then succeeded by a state of coma with stertorous breathing. This either passes off into a natural sleep or is succeeded by another sudden convulsive attack, which follows the same course as the former one. The patient may regain consciousness after the coma without passing into sleep, which is by no means a favorable circumstance, and is likely to be speedily followed by another seizure. The convulsions may follow each other at intervals of a few minutes or even hours. Frothing at the mouth is a frequent though not essential symptom, and the tongue may be bit, especially in the first convulsion. The patient cannot be regarded as safe from the return of convulsions until after the lapse of several days, or, in other words, until the predisposing conditions have been altered or removed. If labor is in progress it is temporarily suspended, as though, according to the theory of Power, there had been a metastasis of muscular energy from the uterus to the voluntary muscles.

In a large proportion of cases delivery puts a stop to the convulsions, and the labor may also continue in the interval between the attacks. Convulsions during pregnancy may precipitate labor, but there must be a considerable interval between the attacks for labor to make much progress. When convulsions occur before or after delivery they present the same appearance and course. There is often a pre-

ceding nerve disturbance from mental emotion or the like cause.

There is but little tendency to spontaneous recovery. The mode of death is either by exhaustion from the repeated shocks of the convulsions or from apoplexy. A punctiform hemorrhage in the brain is perhaps more common than a single large effusion of blood.

The puerperal convulsion has an outward resemblance to some other forms of eclampsia. It so closely resembles epilepsy that the history of the case may be required to decide. Parry has shown that epileptics rarely have convulsions during labor. The uræmic convulsion follows much the same course, but from this the temperature allows us to discriminate it. In puerperal eclampsia the temperature increases with each convulsion, and in fatal cases may reach 107° or 109° F. In uræmia the temperature falls and may be subnormal. Apoplexy, which occasionally happens independently during labor, may also occur as a result of the convulsions. Otherwise the paralysis will serve to distinguish it, nor do the convulsions occur with the same type and rhythm. Hysterical convulsions are distinguished by the entirely irregular character of the spasms, the imperfect loss of consciousness, the opisthotonos and up and down movements of the pelvis. There is also a twitching or trembling of the orbicular muscles of the eye in hysterical attacks.

Causation.—It will be necessary to consider fully the etiology and nature of puerperal eclampsia,

since there is no disease in which treatment is more dependent upon the theory of causation than in this.

The task before the newly pregnant woman is to build up some ten pounds or more of highly organized material, while continuing to maintain the needs of her own organism. She will need to complete this process more blood, more nerve force, and increased functional activity in all her organs. So necessary is the increased amount of blood to maintain the circulation with the added vascular territory, that if the stimulus of fecundation fails to arouse the system, the volume at least of blood will be increased by mere dilution. The woman becomes hydræmic. When this too common condition obtains, the nerve centres and all the organs are poorly supplied with blood. This is followed by increased nerve irritability, which may be said to be the chief factor in eclampsia.

The increased vital activity of pregnancy implies also an increase in the waste products of the body. A greater task is thrown upon the excretory organs, especially upon the kidneys. The waste products of the mother's tissue changes, and also of the fœtus in part, must be disposed of. Meantime the enlarging womb begins to press upon the kidneys, their veins, or the ureters. A great majority of cases of eclampsia occur in primiparæ, in whom it is fair to assume that the enlargement of the abdomen does not proceed as rapidly and completely as in multiparæ, and that the pressure of the womb upon the surrounding viscera is, therefore, greater. This results in crippling the kidneys at the very time when they should be most active. This directly

causes an accumulation of tissue débris in the blood; of substances which ought to be excreted, and which bring it to pass that the irritable nerve centres are supplied not only with hydræmic, but with uræmic and poisonous blood. Uræmia is a convenient designation to include the retention in the blood of other excrementitious substances than urea, but allied to it, this use of the term having high authority.

Another factor is found in the notable increase in the vascular tension during pregnancy, and which continues after labor until lactation is well established.

These facts, which were first formulated into a working theory by Barnes, are generally conceded. Some lay particular stress upon the uræmia, maintaining that renal disease is the chief or only cause, forgetting that we must account for the ten per cent. who do not have any renal disease, as well as for the ninety per cent. who do. But on the question of the state of the circulation of blood in the brain, important differences of opinion exist. Some hold that anæmia of the brain is a necessary condition, and others that the cerebral vessels are in a state of fulness. The theory of anæmia appears to be required by a dictum of the physiologists. Marshall Hall, Astley Cooper, Kussmaul, and Tenner have shown by experiment that profuse hemorrhage, or even ligation of the carotids, may cause convulsions. From this the astounding leap is made of regarding all convulsions as evidence of cerebral anæmia. Astounding, because there is no accompanying minor premise in the shape of a well-proved statement that convulsions cannot be caused by cerebral hyperæmia, or by irritants which do not

alter the intracranial volume of blood. In behalf of this strange logic, the clinical appearances of the disease have been ignored, the conditions found *post-mortem* misinterpreted, and the results of treatment passed over in silence, as though anæmia of the brain must be demonstrated at all hazards, in the brain of the patient or elsewhere. Angus McDonald[1] reports a case in which the post-mortem section, showed marked fulness of the cerebral vessels, in the pia mater, "both large and small vessels being enormously distended with dark blood." But in the basal region, which is also the convulsive area, a tract was found of markedly anæmic tissue. This would be strongly corroborative of the anæmic theory, but fortunately the observer is an honest one, and adds: "at the anterior portion of the right corpus striatum . . . there is a dusky-red spot about the size of a pea, or small bean, in which are seen a number of apparently punctiform hemorrhages." Before the hemorrhage took place, there was certainly no anæmia, but a bursting fulness of the vessels at this place, and even granting the existence of a small patch of anæmia, the general condition of this brain, as of all fairly recorded, is that of congestion. McDonald's explanation of the cerebral fulness is that the cranial cavity must always be full; therefore, anæmia of the deeper portions causes them to shrink, and the bulk is made up by a fulness of the veins in the superficial portion. This would imply that anæmia of the greater part of the cerebrum involved intense con-

[1] Heart Disease during Pregnancy, p. 238.

gestion of the deeper portions of the brain; or, to put it mathematically, if anæmia of one-fourth of the brain causes intense congestion of three-fourths, what would be the result to the one-fourth if the three-fourths should become anæmic.

Another very remarkable succedaneous theory has been evolved by Traube and Rosenstein to strengthen the original anæmic theory. They aver that the hydræmia and increased blood pressure cause a leakage of serum from the vessels and a consequent cerebral œdema. This extra vascular effusion presses upon the vessels so as to diminish their size and make the brain anæmic. The nearly uniform failure of cerebral œdema to materialize upon post-mortem observation, rules this theory out of court. The few cases in which cerebral œdema or effusions are found, are probably due to the same cause as the more frequent hemorrhagic effusions, viz., to the fulness of the vessels during the convulsive attack. It is probable that in the explosive state of the nervous system during pregnancy and labor, more than one cause may serve as the last straw upon the camel's back and precipitate the catastrophe. But cerebral fulness is a necessary concomitant, even if it does not immediately precede. The spasm of the cervical muscles closes the veins returning from the head, and of necessity the brain becomes congested during the convulsion whatever was its original condition. The clinical appearances, and in many cases the mode of death, point to cerebral fulness, and, whether it can be proved in the laboratory or not, it is a rational infer-

ence that cerebral anæmia is not the only or common provoking cause of puerperal eclampsia.

The convulsions which occur after labor are probably due to the altered condition of the intra-abdominal blood pressure. The abdominal walls rapidly condense and regain their tone in normal cases, but in some the flabby and redundant parietes form a striking contrast to the firm pressure existing before and during labor. It may only be a coincidence that I have seen several cases occurring when the obstetric binder was not applied after labor, and have never observed them where it had been applied. This question needs to be investigated more fully, and in the meantime it would be wise to continue the time-honored custom of supplementing the relaxed abdominal walls with a bandage.

Treatment.—The treatment of puerperal eclampsia during an attack resolves itself into an attempt to quiet the irritability of the nerve centres, to diminish the vascular tension and temperature, and to ward off death from apoplexy by diminishing the cerebral hyperæmia. We may fulfil all of these indications at one time by venesection. The volume of blood in the brain will be lessened and the force with which it is propelled diminished, and thus indirectly the nerve centres will be subjected to less irritation. Objections have been made, chiefly of a theoretical nature. It is in flat contradiction to the theory of cerebral anæmia. Venesection does not reduce the normal (unraised) vascular tension in the dog. Loss of blood is rapidly made up by the absorption of fluid from the extravascular spaces, so that its volume is soon restored. Nevertheless the

clinical fact does remain, attested even by those who hold to the anæmic theory, that it does reduce the vascular tension in puerperal eclampsia, and that it is a tried and approved remedy, of more value than any one resource. To be of service it must be performed early. If hemorrhage has already taken place in the brain we will be too late, though even then we may prevent further damage. After many convulsions have taken place there will be little use in bleeding. For this reason it is a remedy which succeeds better in the hands of its friends. Those who believe in venesection employ it at once as the best thing to do; those who are sceptical as to its good effect employ it as a last resort, only to be confirmed in their way of thinking. One should be sure of the diagnosis; hysterical convulsions will not be benefited by bleeding. Inasmuch as graduates in medicine are annually sent forth without any instruction as to this important but unfashionable operation, it may be well enough to state how it is to be performed. Take a towel or the like bandage, and passing it around the arm above the elbow, twist it until the superficial veins below stand out prominently. Those in the bend of the elbow, the median basilic and cephalic are the best to tap. Then with a lancet, bistoury, or other knife, make a liberal incision obliquely in the vein, not in its length, for then it will close too readily; not directly across, lest it be completely severed. Have ready a basin to catch the blood, which will usually spout forth with some force when the vein is opened. The bleeding may be promoted by rubbing the forearm from below upwards and by working the fingers of

the same arm forwards and backwards. Sometimes the blood runs slowly at first, being very dark in hue and of thick consistence. This may be begun while the convulsion is still in progress, the sooner the better. The amount of blood to be taken should be regulated largely by the effect. The pulse should be watched and when it has become soft the bleeding may be stopped. A compress and bandage will usually close the opening in the vein, and if in the haste and flurry too large an incision has been made, a suture may be introduced. The venesection may be repeated if necessary, but one sudden and copious flow will be of much greater service than several small bleedings. Next to blood-letting comes chloral, which directly diminishes nerve irritability, produces cerebral anæmia, and lowers vascular tension and temperature. If it was as prompt in action as venesection, we might dispense with the latter, but its absorption is often slow, and fatal damage may be done before it gets to work. The same objection applies to veratrum viride, much used in some regions as a substitute for venesection. Chloral should be given in twenty grain doses if the patient can swallow, or in double quantity by the rectum. When combined with the bromide of potassium in thirty or forty grain doses, its efficacy is increased. Some time may elapse before the chloral can be obtained, administered, and absorbed. The interim may be usefully filled by administering chloroform, another agent conspicuous in promoting cerebral anæmia. Chloroform may also be inhaled during each convulsion and continued until the period of coma. It is not necessary to give it be-

tween the attacks. Our predecessors used opium in the treatment of eclampsia. This is theoretically inferior to chloral and chloroform, and appears to be attended with some risk. Even small doses of morphia are fraught with danger when the kidneys are inflamed. C. C. P. Clark recommends one grain doses of morphia hypodermically, or even larger amounts. This is calculated to obtund the sensibility of the nerve centres with certainty, and is objectionable only because of the general risk attaching to opiates when the kidneys are crippled. Those who choose to use it will find themselves in good company, but it has not had a sufficient trial absolutely to condemn or justify it.

Another point in the treatment, which may be attended to as soon as the patient can swallow, is to provide for the elimination of the offending matters from the blood. This is to some extent accomplished by venesection, but is probably temporary. For this purpose ten grains of calomel may be administered, which is especially useful when the uræmia is a chief factor in the etiology. We may also do great good in some cases by using a hot pack and causing free diaphoresis. These remedies aid in elimination, and are also derivative, affecting the cerebral circulation, blood pressure, and temperature. Throughout the treatment the patient must be kept quiet, especially if consciousness returns. When she is once under the influence of chloral, she should not be allowed to be awake for very long at a time until the danger of a return has passed away.

Convulsions which occur before or during labor are usually stopped by delivery. If labor is in

progress, we should endeavor to expedite it. If active dilatation of the cervix or the use of forceps is required, chloroform should be administered as a precautionary measure. Indeed, a mere digital examination sometimes affords a sufficient irritation to bring on a convulsion. Force is never necessary, but as soon as the patient can be delivered without violence the better will be her chances.

When the convulsions occur during the pregnancy, in the latter months, it is best to induce labor forthwith, if the convulsions do not of themselves precipitate it. The child has but little chance to survive repeated attacks of eclampsia, nor is the active treatment required likely to allow it to escape unscathed. It may, therefore, be disregarded, and our attention concentrated on the protection of the mother. If this view is correct, there can be no doubt that the mother should be delivered as soon as possible. The fœtal mortality is very great in any event; the maternal mortality depends largely upon the promptness and energy of the treatment. The convulsions which come on only after delivery are most to be dreaded, and all the more because our knowledge of the exact changes which take place in that period of transition is not as full as could be desired.

The preventive treatment is most important. If the woman complains to the physician of swollen feet, puffy eyelids, headaches, he should promptly place her upon saline diuretics. The acetate of potassa, or of iron, administered with glycerine, is an excellent form. Rochelle salts will often be a sufficient remedy. A full purgative dose should be

given at first, after which a teaspoonful, more or less, dissolved in water, may be given two or three times a day. The urine should be frequently tested for albumen, as in this way we may receive information as to the effect of our remedies. When the symptoms are urgent, a full dose of calomel will give prompt relief, and should precede other medication. The headache should be watched as carefully as the urine. If it persists in spite of this treatment, we should administer the bromide of potassium, with or without chloral, which may be added if the headache is very great. Even when our first opportunity of seeing the patient is during labor, we may employ preventive measures with some hope of success. If a woman complains of headache during labor, especially if it is increased during the uterine contractions, it is well to give chloral once or twice in fifteen-grain doses. This is particularly to be done if the patient has suffered from eclampsia in a former labor, or if a history of infantile convulsions can be elicited, and if œdema or other suspicious symptoms be present. It is noteworthy that the lethargic or apathetic condition sometimes preceding an attack, may render the patient insensible to pain, and headache, or other symptoms may be overlooked, if the physician is not on the alert.

CHAPTER XIII.

THE OBSTETRIC FORCEPS.

The most important of the obstetric operations, because of its frequency, is the application of the forceps. This instrument is composed of two steel branches, or blades, which are intended to be applied one on each side of the child's head. We may thus grasp the head as if we had it in our hands, and can pull it forth from the pelvis when the womb is unable to push it out. For convenience and increased power in grasping, the blades are made to cross each other near the middle, and at the point of crossing an arrangement of slot and pivot or mortise, called the lock, is devised. All in front of the lock is called the blade, though the whole branch has the same appellation; all behind the lock is called the handle (Fig. 13). There are many

Fig. 13.

Davis's forceps.

varieties of forceps. Nearly every obstetric teacher has some modification to suggest, or if he becomes eminent, his name may be affixed to some form as a trade-mark. The differences in modern forceps are

slight, consisting in a little more or less width or curve in the blades, or in the nature of the lock or handle. In order that one may make a wise choice from the many kinds offered to him, he should consider what features are essential in any forceps, and of what form an ideally perfect instrument should be.

The Blades.—Two curves in the blade are necessary, if the forceps are to be universally applicable, a head curve and a pelvic curve. The *head curve* is the one which allows the blade to be passed around a head, so that when traction is made, the head will not slip from between the blades. This curve must not be so great that the tips of the blades come close together, and prevent one from compressing the head. The difficulty in applying the forceps is directly increased by the amount of head curve. This has led to the making of the blades too flat in some instruments, so that with a large head there is great risk of their slipping off. The Davis forceps, and the instruments modelled after the same pattern, such as the Wallace, may be guaranteed not to slip. When once applied, they are securely fixed until removed by the physician. This is due in part to their sufficient head curve; partly to their pelvic curve, but also to a secondary head curve through the width of the blade, which is possessed by no other forceps. The Davis blades are also broader than in other forms, which, with the curves accurately moulded to the conformation of the fœtal cranium causes them to fit the head in a superior manner. This peculiarity in the Davis forceps, while it makes them the best possible in-

strument to apply upon the sides of the head, renders them less suited for an oblique application. They do not fit well when applied over the face and occiput, nor when over the fronto-parietal angle and the opposite parieto-occipital angle. They will be quite likely to cut or bruise the child, and there will be a superfluous projection of blade to endanger the vagina. Therefore, one who uses the Davis forceps must be prepared to apply them upon the sides of the head, and not merely place them on opposite sides of the pelvis, as is done by many, and which may be done as well, though never well, by the Elliot, Simpson, White, and other comparatively narrow-bladed forceps.

The *pelvic curve* is of great importance. The original Chamberlen instrument was straight, and could not, therefore, be applied on a head when situated much higher than the inferior strait. I have seen a pair of Elliot forceps, when applied to the head at the brim of a slightly deformed pelvis, slip from the head as soon as traction was made, because they had grasped it only over the cheeks instead of over the central part of the head. This is because they have not curve enough. The pelvic curve should be in fact what it is in name, a curve corresponding to the normal curvature of the pelvic cavity (Fig. 14). The blade can then be placed centrally upon the head at any point in the pelvis, whether the head rests above the brim or upon the perineum. The only forceps with a sufficient pelvic curve for all cases are the Davis and its derivatives, the blades of the Wallace and Lusk's Tarnier. This fact is only of much importance when the head is at

or above the pelvic inlet, or when the pelvis is somewhat deformed. Under other circumstances any curved forceps now in the market have a sufficient curve to enable one to apply them, though not as surely as the Davis. There is such a thing as using

Fig. 14.

The proper pelvic curve.

a poor tool skilfully, and one may become expert in the use of almost any forceps, so that he can succeed with it when a beginner would fail. The central application which the Davis forceps permit, combined with their snug fit when applied to the sides of the head, renders them much less likely to mark or disfigure the head than any other form. Their width of blade allows of a large fenestra through which the parietal eminence protrudes, and thus it takes up less space than a blade too narrow to permit this projection. This width also debars us from their use before the os uteri is well dilated. It is also true that it is difficult to apply the Davis blades unless they are rightly applied, and to the sides of

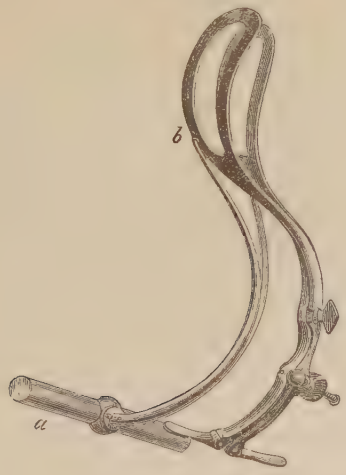
the child's head. A narrow-bladed forceps can be more easily applied, and in any manner as regards the head. These may be regarded as disadvantages in the Davis instrument, but this does not practically appear except in the comparatively rare cases when we are called upon to use them in deformed pelves with the head nearly transverse at the inlet, or during the first stage of labor. For general purposes the wide double curved blade is the safer and most efficient, and if one would be armed against all contingencies, a pair of narrow-bladed forceps should be added to his armamentarium.

The Lock.—There are three forms of lock in common use: the English, or mortise lock; the French, or slot and pivot lock; and the German modification of this, called the button lock. The mortise lock has these disadvantages: it is less secure than the other forms, it is apt to pinch the vulvar tissues while being adjusted; it is possible to close the lock without having the blades inserted to an equal depth; it is difficult to tell at a glance the right from the left blade. In the French lock the pivot is surmounted by a thumb-screw which allows one to make the lock quite loose while adjusting it, and afterwards tighten it. This is conducive to improper usage. The blades should be accurately adjusted to the head, and not forced into correct apposition by a screw. The projecting thumb-screw is also in the way. The button lock derives its name from a flat button-like expansion on the top of the pivot. This requires the blades to be in exact apposition before the slot can be made to slide under the button; and is, therefore, a guarantee of correct application. It

is the firmest lock made, and but little in the way during adjustment. Any forceps can be modified by having the button lock without interfering with its other peculiarities, and it is a change well worth making. The blade with the pivot is called the *male* blade; the one with the slot the *female*.

The handles should be small, but of sufficient size to be readily grasped. The thin metal handles of the Hodge and Wallace forceps are apt to cut or at least to tire the hand when grasped firmly for any length of time. In most forceps a piece of wood or

FIG. 15.

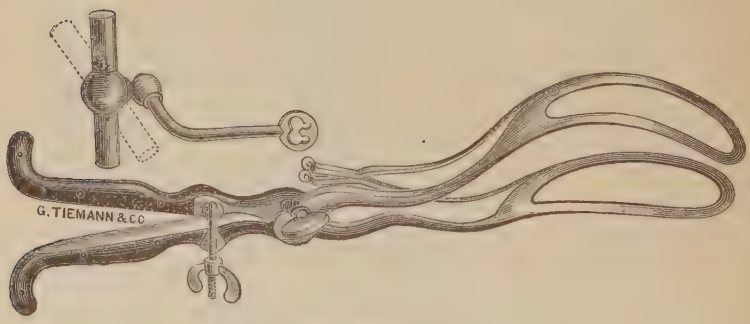


Tarnier's forceps.

hard rubber is affixed to each handle, making it more comfortable in the hand. All projections in the nature of rings, shoulders, and blunt hooks are wrong in principle and liable to be in the way. They are affixed in order to allow of powerful trac-

tion in the line of the handles, which should never be employed, and hence these incitements thereto should be absent. A length of six inches from the lock to the end of the handles is ample, as it is rarely necessary to grasp the handles with both hands. This description applies to the great majority of forceps now in use. Special mention must be made of instruments intended to enable us to make traction in the axis of the pelvis. Of these but one has attained to general use, viz., Tarnier's, or Lusk's modification of Tarnier's forceps (Figs. 15 and 16).

Fig. 16.



Lusk's Tarnier's forceps.

The rods affixed to the blades are to be pulled upon by means of the crossbar, and in this way it is expected that we can pull more directly in the axis of the pelvis. There is also a screw attached to the proper handles, which enables us to compress the child's head to a greater extent than can be done with other forceps. On this account, rather than because of the other machinery of the instrument, it is sometimes useful, and should have a trial before

deciding that the forceps cannot deliver, and that craniotomy is indicated. Its great expense will prevent it from ever coming into competition with other forceps. There are many instruments in a like category, which, while occasionally very useful, are too expensive, in view of their infrequent use, to warrant the average practitioner in purchasing them. A full line of instruments for craniotomy, for instance, may be imperatively demanded at long intervals, and very likely in charity cases. It would be a useful innovation if local medical societies would set apart a fund for the acquisition of such instruments. They might be left in the charge of the secretary, and be subject to the call of any member in good standing. This might also develop a higher appreciation of "good standing," and thus promote professional peace.

Application.—There are two places at which the head is liable to be arrested during labor, at the inlet and outlet of the pelvis. When the head has reached the outlet, or when it presses upon the perineum, it will have rotated so that if the blades are applied squarely on opposite sides of the pelvis, they will be applied to the sides of the child's head. At the inlet the head is obliquely situated, and if the forceps are applied in like manner to the sides of the pelvis, they will be placed over the parieto-frontal angle of one side and in a similarly oblique position behind. The forceps should always, if possible, be applied to the sides of the child's head; and, therefore, the method of applying them at the inlet will differ somewhat from that employed at the

outlet. The reasons for applying the forceps to the sides of the head are as follows:

1. No matter what forceps are used, there will be less risk of injury to the child, because the blades fit better and rest upon less important tissues than when one of them is placed upon the face wholly or in part.

2. Being applied in a definite manner, we know exactly what we are about when we move the forceps and how the motion affects the head. We can flex or extend the head, or move it as we please, and this we can do imperfectly, if at all, when the blades are not on the sides of the head. Indeed, if the blades are applied without reference to the sides of the head, the physician is probably ignorant as to the exact relations of the head and forceps.

3. We can reduce the size of the head by compression, making the biparietal diameter less by even an inch in some cases. By flexion we may substitute the cervico-bregmatic diameter for the occipito-frontal, and thus by both compression and flexion may reduce the presenting outline of the head in all directions.

There is, therefore, good and sufficient reason for always using the forceps in this way if we can, and when it is not feasible, we must fall back upon an inferior method. This is very different from making a rule based upon the rare occasions on which the application to the sides of the head is impracticable.

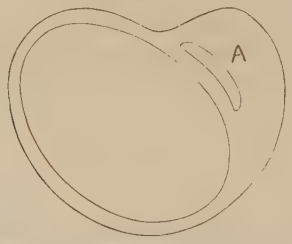
The consent of the patient is always to be obtained before using instruments. With a little tact this may always be secured without conflict. When the

labor is hard and the second stage proceeds slowly, it is well to announce that if the woman should be unable to deliver herself in an hour, more or less, we will do it for her. She has time to reflect, and to become tired of fruitless effort, and by the time set will usually be ready, while an immediate attempt to use them would have encountered serious opposition. Until one has had a little experience in their use, it is safer to summon a consultation for the physician's protection, if for no other reason. Should even unavoidable harm happen, perhaps entirely unconnected with their use, a jury would be fatally influenced by the confession that the physician had not previously used the forceps, or but a few times. Their application being determined upon, the woman is to be placed crosswise in the bed, with the buttocks at the edge, so that the vulva overhangs the edge. Her feet should be placed upon two chairs, the legs being each covered with a sheet, so as to avoid any exposure except of the vulva itself. A third chair should be placed between for the physician. Meanwhile the forceps should have been laid in a basin of warm water, which is to be placed near to the physician's hand.

At the Inlet.—The application to the head at the pelvic inlet will be first considered, and with the head in the usual L. O. A. position. It is to be noted (Fig. 17) that there exists opposite the left side of the head a free space under the left sacro-iliac arch, so that there will be no difficulty in passing a blade (A) in this direction. At all other points in the pelvic circumference the head is closely applied to the pelvis. If the blades are placed one on either

side of the pelvis, so as to grasp the head obliquely, each blade will have to be carefully insinuated between the head and pelvis. In the application of the forceps to the sides of the head this is true of only one blade, while the one which goes on the left side of the head will almost find its way of its own accord, so ample is the space provided.

Fig. 17.



The outline of the inlet, including outline of the head, showing the ample space for the blade A, section of blade.

Bearing this in mind, we should take up first the male blade, grasp its handle in the left hand and anoint the blade and our right hand with vaseline or other unguent. The fingers of the right hand are then to be passed into the vagina far enough to enable us to reach the rim of the os uteri upon the left side of the pelvis. We then press the tip of the blade against the palm of the right hand, while the end of the handle should be held perpendicularly above the inner margin of the mother's right groin. We then pass it into the vagina, following the pelvic curve, and much as we would pass a male catheter into the male bladder. When the tip of the blade has reached the head we carefully guide it between the cervix and head, this having been the main

reason for introducing the right hand, viz., to see that the blade went within and not without the os uteri. The blades should not be introduced during a pain, and as their introduction is liable to provoke a uterine contraction, we may have to pause occasionally in introducing them, going on as soon as the contraction subsides.

The right hand may now be withdrawn and the blade gently passed around the head, considering now the head curve more than the pelvic curve. With a very little pressure the blade glides into position without much or any guidance, because under the sacro-iliac arch there is no hindrance to its passage. It should be pushed as far as it will go, pressing the handle well against the perineum. We then dry the right hand, anoint the left hand and the female blade, and taking the latter in the right hand, proceed to introduce it. The circumstances are now different. The right side of the head is quite near, while the left side is remote. We, therefore, had to pass the first blade well into the pelvic cavity before it encountered the head. Now we must begin curving the blade around the head almost as soon as we begin to introduce it. It is from overlooking this point that difficulty is commonly experienced in introducing the second blade. In order to guard the cervix, it is usually sufficient to introduce two fingers of the left hand. The forceps should then be held so as to lie fairly in the left groin, and when we advance the blade into the vagina, it is by moving the handle forward until it can clear the mother's thigh. It is then to be moved rapidly backwards with a somewhat spiral

motion. The intent is to place it directly opposite to the blade which is under the left sacro-iliac arch, or, in other words, just behind the obturator foramen. The tendency of the blade will be to slip backwards under the right sacro-iliac arch. This is because when flexion of the head takes place, the sinciput of the child is moved forwards from the close apposition to this arch which it maintains while unflexed, and thus a free space is left on this side as on the other. This tendency may be counteracted by placing a finger under the upper bar of the blade and by moving it towards the symphysis pubis while advancing the blade. If successful, the middle of the female blade will come down on top of the one first applied in such a manner that the slot will be just opposite the pivot, and prepared to slide easily under the button. The handles are then to be pressed together and the instrument is applied and locked.

This method of application differs from the one usually taught in that it is here advised to keep the second blade well in front from the beginning, while it is usually recommended to pass it much as the first blade, under a sacro-iliac arch and then bring it forward. If it is to be brought forward only to the middle of the pelvic side and without any reference to the sides of the child's head this may be done with little risk; but to bring it around so as to be opposite to the blade first passed, is a difficult if not dangerous undertaking. I have seen cases where, because of the imperfect dilatation of the os uteri, it was necessary to pass the second blade behind and under the right sacro-iliac arch before bringing

it around in place. These cases are rare, and the rule should be to pass it from the beginning just where it is needed. If we fail, it is better to withdraw it partially or altogether, and try again. There is very seldom any difficulty in passing the first blade. If there is, the physician should again examine carefully as to the diagnosis of the position, and it will probably be found that it is in the second or fourth position instead of the first. The blades cannot sometimes be locked because they are not sufficiently introduced, in which case we may succeed in locking by pressing both the handles well back against the perineum.

This same method of application can be used when the vertex presents in the *right occipito-posterior* position, since the head occupies the same portion of the pelvic inlet (the right canal, as I have elsewhere[1] explained), only with its poles reversed. The first and third *facial* (L. M. A. and R. M. P.) positions are in similar relations to the pelvis with the first and third positions of the vertex, and the forceps may be applied in the same way. But in the second and fourth positions either of the vertex or face, the relations of the head and pelvis are transposed, the head entering the left canal of the pelvis. Therefore, to take the R. O. A. as the type, the first blade of the forceps is to be applied under the right sacro-iliac arch, the second opposite it and behind the left obturator foramen. If we were to apply the male blade first, it would be much in the way, and to apply the blades upon the side of the head they

[1] How to Use the Forceps, 1880, and Appendix to Quiz Compend.

must be placed in this relative position, the male blade coming in front. This results as follows: The female or slotted blade is first passed on the right side, but otherwise precisely in the same manner as the first blade in the L. O. A. position, with due change of hands from right to left and *vice versâ*. The male blade is then passed, but as we bring it down upon the first blade, we find that the lock cannot be adjusted, the female blade being under instead of over the male blade as it should be. This is easily corrected by bringing both handles into the median line and so across until we can lift the female blade over the male, and thus allow the slot to come opposite the pivot. If done carefully, it can do no harm, and the application is much easier than in any other way. As the second and fourth positions are not common, we are seldom required to depart from the method first described.

At the Outlet.—When the head reaches the pelvic outlet, it is or should be situated with its long diameter in the median line; the sides of the head are, therefore, squarely on opposite sides of the pelvis. The male blade is first passed. Two fingers of the right hand having been introduced as a guide, the blade is held about at right angles to the median line, its tip pressed against the palmar surface of the two fingers. We then proceed both to pass it onward in the direction of the pelvic curve, and at the same time to pass it around the globe of the head. This results in a spiral movement of the blade. The female blade is then passed in a precisely similar manner upon the right side, using two fingers of the left hand as a guide. If the head has not entirely

escaped from the womb, we can always feel a segment of the rim of the cervix immediately in front, and can start the blades properly within the edge of the os uteri. If it is out of the womb, the cervix no longer needs to be guarded.

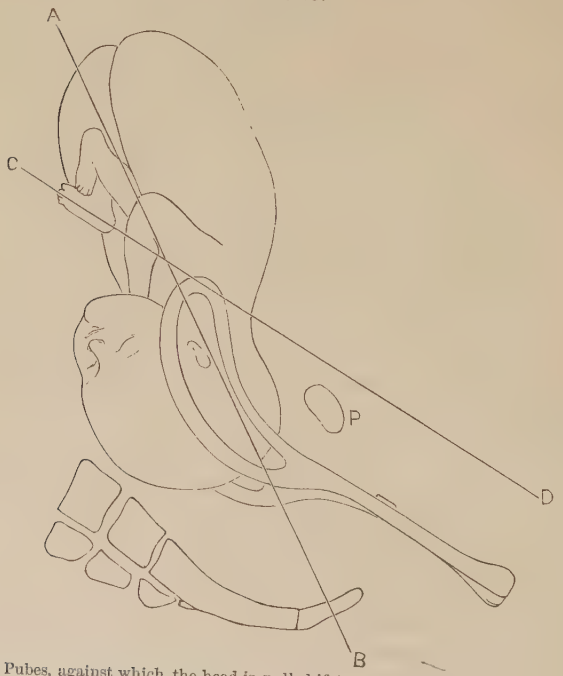
It is well to remember that the caput succedaneum is sometimes large enough to project as far as to the inferior strait, when the head itself is still at the inlet. One should always make sure of this point, and that the head has rotated, before applying the forceps in this manner. The handles will lie in the median line when the application is finished, and will not press upon the perineum, as is the case when the head is at the inlet, but owing to the shortness of the pelvic canal in front, there will be a surprisingly slight difference to all appearance in the depth to which the instrument is introduced at the two levels.

In Head-last Labors.—The forceps are sometimes applied upon the after-coming head when its delivery is delayed in the breech presentation. Whether we shall rely upon the forceps or upon manipulation in these cases, appears to be a matter of personal preference. Some can deliver more expeditiously and certainly by the unaided hand, but there is no objection to the use of the forceps if one is more sure of his skill in that way. The method of application is substantially the same as when the head presents first. The child should be seized by the legs and drawn up and over the mother's abdomen by an assistant while the blades are passed alongside the neck and upon the head. If there is any hope of saving the child's life the physician must work

with rapidity; and, hence, should have acquired some skill in less difficult applications before attempting so delicate a task.

Traction. *At the Inlet.*—When the forceps are applied are we then to pull forth the child? If we pull in the right direction, this may be answered in the affirmative; but in order to make traction in the

Fig. 18.



P. Pubes, against which the head is pulled if traction is in the line C D, or parallel to the handles

proper way, we must not simply lay hold of the handles and pull in the line of the handles. The child's head is around the corner, as it were. If

we merely pull upon the handles, all parts of the instrument and of the head, which is at present firmly attached to it, will move in a line parallel to the handles. The ends of the blades will move in the line C D, Fig. 18, thus bringing the head against the symphysis, and not at all advancing it in the way it should go. For the head must first be propelled in the line A B, Fig. 18, afterwards changing its direction according to the pelvic curve, and trac-

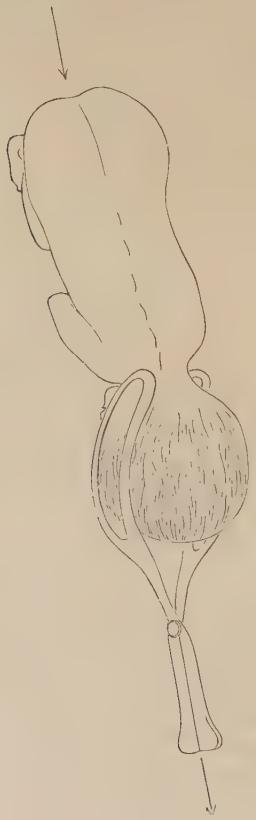
Fig. 19.

The arrows show the direction in which force is applied. A, by the left hand; B, by the right hand; C, the resultant of the two forces.

tion in the line C D is, therefore, wasted energy. It is, indeed, worse than wasted, because the head is injuriously pressed against the bladder and other structures. We may then give up at once any expectation of delivering the head by pulling with both hands upon the handles with might and main, pushing the foot against the bed to gain additional force, or getting some one to grasp us around the

waist to help us pull. Such actions are as wrong in principle as they are dreadful to behold. But if we are to exert our force so as to advance the head, we must do something else than pull, we must also

FIG. 20.



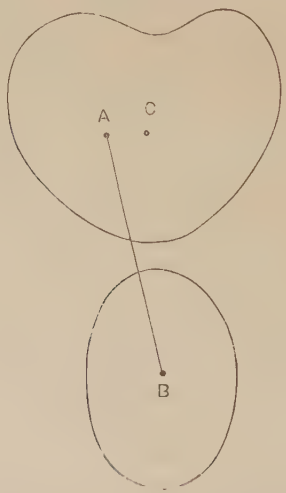
Showing the divergence of the child's course in delivery from the median line.

push. This is done by placing one hand in front of the lock, as in Fig. 19, and pressing or pushing downwards and backwards in the direction of the

arrow A. It is not important that this particular disposition of the fingers be made, as long as the force is applied in front of the lock and in the direction just noted. The right hand should grasp the handles and make direct traction, not with much force at first, but increasing as the head descends. The head will move in the resultant of the forces brought into action by the two hands, or in the general direction indicated by the curved arrow C, or in such a curve as is shown in Fig. 14. Another fact must be remembered. The handles when applied to the sides of the head at the inlet will not at first lie in the median line. Fig. 20 shows the child placed in the axis of the uterus which does not correspond to the median line of the body, because the womb is, or should be, in a state of right lateral obliquity. The centre of the child's head does not coincide with the centre of the pelvic inlet, but with a point decidedly to the right of the centre (A, in Fig. 21). When the head reaches the outlet, its centre will be in the median line, B, in Fig. 21; therefore, the centre of the child's head in passing through the pelvis has such an amount of lateral motion as is indicated by the obliquity of the line A B, Fig. 21. We should be careful then in making traction not to bring the handles into the median line at once, but to pull in such a manner that only when the head has reached the outlet should the handles be exactly centrally placed. With this lateral deviation we endeavor to move the head in the curved line of the pelvis, altering the direction of the force gradually as the head advances. As the head comes to the pelvic floor, it will be necessary

to shift hands, so as more conveniently to turn the handles over towards the mother's abdomen, upon which they should rest as the head escapes from the vulva. It is in order to secure this "axis-traction" that the rods are affixed to the Tarnier forceps. These rods press upon the perineum in a threatening manner, and are incapable of permitting more force

Fig. 21.



C. The centre of the inlet. A. The centre of the right canal of the pelvis, coinciding with the centre of the head in the L. O. A. position. B. The centre of the outlet.

to be used in pulling than by pressure from above, nor can the true pelvic axis be more accurately followed. It might be thought that this mode of traction would be insufficient in case of a tight fit between the head and pelvis, and it certainly has a less appearance of force than when the physician leans back with his foot against the bed, and his whole

weight thrown in the line of the handles. It is, however, evident that even moderate traction in the right direction will be more effective than very powerful pulling the head against the pubic bones. Substantially the same proceeding was originally suggested by Osiander[1] as a resort in *contracted* pelves.

Traction is not to be employed continuously. We have undertaken to supersede impotent Nature, but we should do her work as it should have been done, that is, by intermittent efforts. When we grasp the forceps there will be more or less compression of the fœtal head. If this were kept up for a long while, the child would perish from the interference with its cerebral circulation. By imitating the natural efforts, we relax all pressure at intervals, and in this way may continue traction for hours if necessary. The traction may last about a minute, and be followed by a similar interval of rest, during which our grasp of the handles should be entirely relaxed, and the lock loosened somewhat. It is not necessary to make the tractions during the uterine contractions. The forceps are used perhaps oftener for uterine inertia than for any other cause. We may disregard the contractions altogether, except when the head reaches the perineum, and then we should make traction only in the absence of the contractions, if possible, for reasons already given in discussing the management of the perineum.

In the majority of cases we may expect to deliver with the forceps within fifteen minutes after they

[1] Nægele, section 463.

have been applied. Where there is disproportion between head and pelvis, or similar obstruction to labor, we may require an hour or more in which to deliver. At all hazards one must avoid being in a hurry, and exercising too much force under the dread of failure. If traction is made in the right direction, it is scarcely possible to exceed a safe limit of force, but when the head is pulled against the pubic bones any force is hurtful in direct proportion to its amount.

Compression.—In grasping the forceps a certain amount of compression is inevitable, if the head is of average size. This compression can be considerably increased until the handles are in close apposition. The larger the head is, the greater the amount of compression is possible. A head may be so small that the handles will close completely with little pressure. If the head is large, the need of compression will be greater also. There is much difference in the compressive powers of different forceps. The Lusk-Tarnier instrument is the most powerful. The Davis may rank next, especially as its peculiar secondary head curve prevents the blades from springing or yielding without compression, as most narrow-bladed forceps, like the Simpson, will do. Compression of the head, when the blades are applied to its sides, will reduce the length of the biparietal diameter. The Davis forceps measure through the blades three inches when the handles are closed. It is, therefore, safe to say that a head can be compressed by them until its biparietal diameter is reduced to three inches. In other forceps we will have more or less springing of the

blades, so that no more compression, if as much, can be expected. In the Lusk-Tarnier the amount of compression is little if any greater, but the screw attachment enables us to make the compression more evenly and certainly than in any other form. Whatever instrument is used, the compression should be made slowly and gently, but firmly, and continued only during the tractile effort. The natural efforts will often mould a large round head into a long cylinder, yet without permanent ill-effect upon the child. We may do the same with the forceps, if we proceed in the same way, the difference being that we can exert a little more power and maintain absolute control over the regularity of the process. Nothing will be gained by permanently compressing the head, and the child will be in great danger of stillbirth; but compression properly made during traction is not likely to do any injury, and often greatly assists in the delivery. It is because of the value of compression as an aid to traction, that the application of the blades elsewhere than upon the sides of the head becomes so objectionable. When the forceps are obliquely applied, they cannot compress the head much without cutting the forehead or temple of the child, nor is there any mechanical gain, since the biparietal diameter is lengthened rather than lessened under these circumstances. In many cases we need to make little if any compression other than that which is made by the pelvic walls which hold the forceps on the head. But when needed, it may be used without fear.

Leverage.—The forceps have also the properties of a lever which may be properly or harmfully used.

The most important instance of this use is in aiding flexion of the head. When the forceps are applied upon the head at the inlet the handles are at first so far back as to press upon the perineum to a considerable extent. The most common mistake which learners make in using the instrument is to begin operations by drawing the handles up to a convenient level. If at the same time the handles are firmly grasped, so as to move the head with the blades, the head will be extended if in an occipito-anterior position, or flexed if the occiput is posterior. In the latter case this movement is entirely proper. We should begin by flexing the head in this way, as pointed out in treating of the management of occipito-posterior positions. If the occiput is anterior, we should avoid elevating the handles at first, unless we desire to flex the head in the following manner: We should move the handles forward, but with the lock a little loosened, and without any compression of the handles, so that the blades will slide upon the head. If, when we have the handles as far forward as they can be brought, we now grasp the head firmly by slowly bringing the handles together and push the handles back against the perineum, we will probably flex the head; certainly, if the blades move as desired when the handles are carried forward. The important part played by flexion in the mechanism of labor makes this a valuable property of the forceps. And, again, it must be noted that if the blades are not upon the sides of the head, or if we have failed to make a diagnosis of the position at all, such movements as this will be ineffectual or hazardous. By means of the forceps we may also

regulate the proper degree of flexion or extension of the head as it passes over the perineum.

It is recommended by some that we should combine with traction a side to side swaying motion of the forceps, the pendulum leverage as it has been called. The practice is one of great antiquity. Albucasis, in extracting the head after craniotomy, recommends that it be moved not perpendicularly only, but "*ad omne latus*," or as one would do "in extracting a tooth." Denman moved the handles up and down as an assistance to traction. The practice was begun in ignorance of the true mechanism of delivery, and is continued only by those who are wilfully blind to its nature. The real effect of swaying the forceps from side to side is alternately to press against the sides of the pelvis in order to pry the head out as by crowbars. We cannot pry upon the head without making a fulcrum of the mother's tissues. That there is no mechanical advantage to offset the manifest harm of bruising the mother, has been elaborately demonstrated by Galabin, Matthews Duncan, and Albert Smith. To reproduce their arguments would take up too much space, and the question may safely be left to the common sense of an enlightened profession.

The normal movements of rotation which the head undergoes in its several positions, may be aided by the forceps. It is seldom proper to force rotation, in the only cases in which it is likely to be delayed, viz., occipito-posterior and mento-posterior positions. But when we find a head inclined to rotate we may render assistance by hastening the movement.

When to Use the Forceps.—When the head presents either by the vertex or face, it is accessible to the forceps. Their application may be required: 1, when there is a disproportion between the head and maternal passages, to whatever cause it may be due; 2, when there is a defect in the expulsive force; 3, in cases requiring quick delivery, as in placenta prævia or eclampsia. The main prerequisite is that the os uteri is fully dilated. This is not absolute. We may under some circumstances apply the forceps within an undilated cervix, but there should be a clear necessity for it. When the os is fully open, the sooner the child is born the better. With the majority of multiparæ a few pains suffice to complete the second stage of labor, and when labor is delayed at all in this stage, it is to the detriment, great or little, of both mother and child. This being conceded, we have only to consider in any cases of delay whether the application of the forceps will be more injurious than allowing the labor to proceed unassisted. The risks attendant upon the use of the forceps begin with the mental effect which is commonly produced by the idea of an "operation." Also with unintelligent persons the physician incurs some risk of being charged with any ill-event which may follow their use, however improbable the dependence may be. Apart from such secondary considerations the risks are in suitable cases a purely personal matter. If the physician and the forceps are *clean*, and the instrument is used with skill, there are absolutely no risks properly belonging to their use, except when the application is postponed until it is too late. If we waited, as our predecessors did,

until the ear could be felt, and the head had been stationary for at least six hours, and if we had as clumsy instruments as they had,[1] we would have like reason to urge great caution in their use. With the modern instrument and proper use they are productive of good only.

For a general rule, the one first proposed by Parry is that most commonly applicable, viz., that the forceps may be applied if the head is not delivered after two hours' continuance of the second stage of labor. It will be very seldom that anything can be gained by waiting longer, and we may frequently do well by an earlier application. One of the most important points in the application is that the instrument should be clean. After using the forceps they should not only be cleansed at the time, but after the physician has returned home they should again be washed, scoured, and polished, so that they are as good as new at each application. The woman should also be properly prepared for their use. She should be told that their use will not be attended with pain, and that she will suffer no more than with the labor-pains, and that there is no danger in their use to either mother or child. With advancing civilization there is less opposition to their use than formerly, and when once used, the woman is apt to request their employment in any subsequent labor. The bowels should be emptied by enema if necessary, and the bladder evacuated if possible. A catheter cannot always be passed, especially if the head has come to press upon the urethra, but this

[1] A Levret forceps before me weighs 2 pounds $2\frac{1}{2}$ ounces; a Davis, 11 ounces.

will be of little moment if the case has been properly managed from the beginning, and the bladder kept empty.

As a rule, anæsthetics should not be administered. The application is not painful, and there is, therefore, no more need of anæsthesia than in ordinary labor. It is also greatly to be desired that the woman shall be conscious, and able to express her feelings. One should not pinch or bruise the tissues under any circumstances, but the beginner especially will find it a material help if the sensations of the woman inform him when he is going astray in the application of the blades. And inasmuch as no injury can be inflicted without causing pain, we can make the woman herself a witness of the proper application of the forceps, should any complication thereafter arise. The physician should keep cool, and not allow himself to become excited at the prospect of failure, either during their application, or when making traction. If he is well informed as to the anatomy and relations of the parts concerned, he cannot fail, except in cases unsuited for the use of the forceps. Should difficulties arise, he should suspend operations, and again carefully investigate as to the position of the head and size of the pelvic cavity, lest some overlooked condition is causing the difficulty.

The limit of use for the forceps is generally stated to be a contraction to three inches in the conjugate diameter of the inlet. A better rule is to try to apply them in any case where the pelvis is not obviously too narrow to admit of their entrance, and if they can be applied to the sides of the head, there is hope of completing the delivery.

CHAPTER XIV.

VERSION.

The operation by which the child is turned from one presentation to another is called version. If it results in bringing in advance the head, it is called cephalic version; if the breech is made to present, podalic or pelvic version. Its primary and principal use is to convert transverse or irregular presentations into those of the breech or head. A secondary use is in cases where rapid delivery is required and the forceps are not at hand or contraindicated: we may then perform podalic version, which allows us to seize the child by the feet and extract at once. Podalic version is also recommended as an elective operation in deformed pelves, from the alleged facility with which the after-coming head can be dragged through the pelvis.

Version may be performed in one of three ways; by external manipulations through the abdominal walls; by internal manipulations, the hand being introduced into the womb; and by a combination and modification of the external and internal methods, called bipolar version.

External Version.—In performing external version we must first make out with exactness the position of the breech and head of the child through the abdominal walls. Then, while we push upon one end of the child in one direction, the other hand

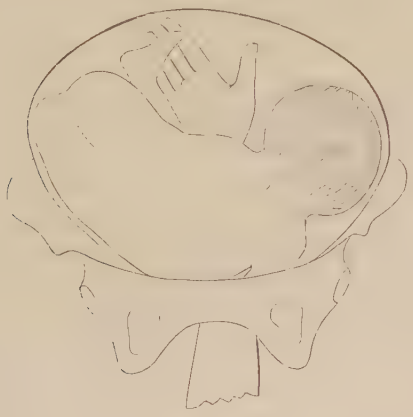
presses the other end in the opposite direction. Both the diagnostic palpation and the subsequent pressure must be done in the absence of a uterine contraction. This method is seldom feasible, requiring not only the presence of the liquor amnii, but also some skill in abdominal palpation. The necessary manipulation is also painful, so that it possesses no advantage over bipolar version.

Internal Version is the oldest method and the one most generally applicable. The woman should first be placed in the position recommended for the application of the forceps, because this gives the readiest access to the pelvic passage. Supposing then that a transverse position is to be rectified, we consider whether cephalic or podalic version is to be preferred. If the condition of the woman is good and the pelvis roomy, it will be well to bring down the head. This may be contraindicated by the prolapse of the arm or by the existence of other complications, or it may be impracticable. If not, the hand well anointed is passed slowly and gently into the vagina, through the os, and into the womb. Sliding it cautiously over the head we grasp the latter and endeavor to bring it to the inlet. At the same time the other hand may be employed in pushing the breech in an opposite direction. It makes little difference which hand is to be introduced, but the old rule is to use the right hand if the part to be brought down is to one's right side, and the left hand if it is towards the left. If we succeed in bringing down the head and making it present, the further progress of the case may be left to the uterine contractions, or we may employ the forceps

and deliver forthwith. If delivery is delayed, a watch should be kept lest the malpresentation be restored, since the same causes which led to it originally, such as great uterine obliquity, may still exist.

Podalic Version is performed in a similar manner. The hand introduced into the womb is to be kept pressed flatly to the child's body and passed in front, behind, or to either side in search of the legs. When a foot or knee is found the hand should, if possible, be pushed a little further in order to seize the more remote knee or foot, or rather the one opposite to

FIG. 22.



Internal version.

the presenting shoulder, Fig. 22. This will facilitate turning, because as we pull upon the leg the shoulder of the opposite side, which will be presenting, will be the more readily pulled up. In the dorso-anterior position we should pass the hand well

back towards the sacrum, in order to reach the legs with ease, and in dorso-posterior positions we will reach them more readily by keeping the hand in front towards the symphysis pubis. If the child's leg is flexed, we may hook one or two fingers in the bend of the knee and pull upon it to the best advantage. If not, or if considerable force is required to move the child, the foot or leg will afford a better hold. Great care must be taken that it is a foot and not a hand which is grasped. When we have secured the leg, traction should be made towards the pelvic inlet. While the breech is thus pulled down a hand upon the abdomen may assist, either by pushing the breech downward or by similar pressure upon other parts of the child. If the child is alive and its tissues resilient, and if the liquor amnii is but recently evacuated, turning is usually accomplished readily; as we pull down the breech the head ascends, and thus the process is completed. If the child is dead, and therefore inelastic, and the operation has been delayed until a part of the child is wedged into the inlet, and the womb tightened about the rest, with tetanoid contractions, it becomes a difficult and dangerous operation, and may be entirely impossible. The membranes should not be ruptured until the hand has been introduced for some distance, but more often we are called upon to perform it under more difficult conditions.

The dangers of podalic version are many. Besides subjecting the child to all the risks incident to the breech presentation, there is great danger of lacerating the uterus. Especially is this true when we are compelled to force the hand past an impacted

shoulder in a transverse presentation. At any time an incautious movement of the hand may press the knuckles through the uterine wall. In attempting to push up a prolapsed arm, the thinned cervical tissue may tear. Even the most skilful operator may do mischief in performing version, and in this respect it stands in marked contrast to the use of the forceps. On the other hand, an easy case of version is very easy. When the liquor amnii is present and plentiful and the pelvis of ample size, it is so free from difficulty, especially when the bipolar method is used, that one is in danger of preferring the operation too enthusiastically. A good corrective may be found in an attempt to turn a neglected shoulder presentation impacted in a narrow pelvis. The operation is also to be approached with hesitating diffidence when one is called to a case where an ignorant midwife or physician has been endeavoring to turn for some time, and when we do not know to how much strain the cervical tissue has been subjected.

Bipolar Version.—This is a somewhat recent addition to our resources. The late Dr. M. B. Wright, of Cincinnati, first published its essential features, but, as is often the case with discoveries, the seed fell on a stony ground, and the method had to be reproclaimed with louder voice by Braxton Hicks before it was adopted. It is not suitable for all cases, but when undertaken early with the membranes unbroken or freshly ruptured, it may be expected to succeed. In the left dorso-anterior position the right shoulder presents, the head is in the left iliac region, and the breech extends above the

right iliac region. To perform cephalic version a hand is introduced into the vagina and two fingers made to press upon the presenting shoulder. We then push up the shoulder and at the same time direct it towards the right ilium. Meantime, the other hand presses upon the head through the abdominal walls and pushes it downwards and towards the centre of the inlet. Presently the shoulder will have been pushed beyond further reach and by that time the head will have been made to descend so that the fingers may secure a hold upon it, and, continuing this manipulation, the head is placed in the inlet as in an original presentation of the vertex. Instead of pressing down upon the head it is useful sometimes to alternate with a pulling or pushing movement on the breech to direct it towards the median line. It may not be necessary always to introduce the hand into the vagina if the two fingers can reach easily the presenting part. Podalic version is performed in a similar manner, the fingers pressing upwards and laterally, while the other hand guides the breech towards the inlet. The prolapse of an arm does not interfere with podalic version; indeed, the arm may be used as a staff to push up the shoulder in some cases.

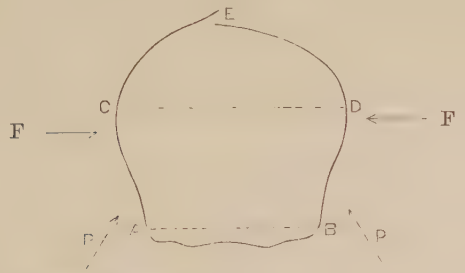
This method may also be used when the vertex presents and it is desired to substitute the breech, but its best application is in transverse presentations.

Version in Deformed Pelves.—When the pelvis is deformed so that the head does not readily enter the inlet, it is held by some to be better to deliver by turning, so as to bring the head through last instead

of attempting to extract it first by means of the forceps.

The basis of this claim is the facility with which the parietal bones may be made to overlap each other and the occipital bone, when the head is dragged through the pelvis with its base first. Fig. 23 represents a section of the fœtal cranium. If the bimastoid diameter AB passes through the pelvis in advance of the biparietal C D, the pelvic walls reflect force upon the sides of the head so as to compress it and cause the parietal bones to overlap at E.

Fig. 23.



A B. The bimastoid diameter.
C D. The biparietal diameter.
E. The overlapping sagittal suture.
P P. The direction of the pelvic force tending to compress the head.
F F. The direction in which the forceps act.

These forces act in the arrow lines, P P. There can be no doubt of the power which this mode of traction brings into action. The bones of the cranium have been broken or indented by the promontory, and occasionally living children have been delivered in this manner through greatly contracted pelves. But it should be equally evident from the diagram that when force is applied in the lines F F, it will

much more effectively compress the head than when applied through the lines P P, provided the force is equal in each instance. In the one case the power is directly applied, in the other, obliquely. With a pair of forceps having good compressive power, the biparietal diameter can be compressed more surely and safely than by dangerous traction upon the child's neck after version. Here then is the true point at issue. If the forceps can be applied to the sides of the head, they can compress the head as well or better than can be done by traction after version, and by implication compression can be effected more easily by the latter method when the forceps cannot be applied to the sides of the head. For, when the forceps are applied over the face and occiput or even obliquely upon the head, they compress the antero-posterior diameter of the head at the expense of making the biparietal diameter longer by the bulging out of the sides of the head. We have then to consider a balancing of risks. The forceps will act not with absolute, but with comparative inefficiency, and will be in danger of cutting or bruising the child's head. Version, when performed by the internal method, greatly endangers the mother, and the subsequent traction, while effectively compressing the head, exposes the child to all the risks of the breech presentation, and to added risks if much strain is put upon the neck by powerful traction. The neck breaks with an average pressure of 100 pounds. We must also consider that if we fail to extract by the breech, the alternative is craniotomy, which is decidedly more difficult to perform upon the base of the skull than upon the

vertex. It must also be remembered that, although the forceps when obliquely applied upon the head, do primarily lengthen the biparietal diameter, they may subsequently be made to imitate the natural method of head moulding if they succeed in getting the head to engage at all in the inlet. Little by little as the compression continues, the head is wire drawn, and if we have patience may be delivered. The possibility of danger to the mother may be excluded if the forceps are correctly used and no other use should be discussed. This may require an hour or more, and is much less brilliant than the rapid delivery which may follow version (and may not), but with some limitations is certainly less hazardous. It is not worth while to appeal to statistics, as they may be made to show for either side of the question.

When we can apply the forceps to the sides of the head, we have the case under our control, and can deliver if the disproportion between head and pelvis is not too large to be overcome without craniotomy. When we cannot so apply them, we should put them aside and make trial of bipolar version, as not hazardous to the mother and therefore fairly to be compared to the forceps as to the risks to which the child is subjected, which seem to be nearly equal. If bipolar version is impracticable, an attempt should certainly be made to draw the head into the inlet with the forceps applied as nearly as possible to the sides of the head. If the head can be made to engage, it can be delivered with fewer risks to the mother and child by the forceps. If the head cannot be made to engage, version may be resorted to in a pelvis

which measures not less than three inches in the conjugate. A small child may be delivered through a smaller space than this, but, with our imperfect means of determining the child's size, it is not well to risk version in a pelvis much less than three inches in the conjugate. To fix an absolute limit is not wise. Skill in turning or in the use of the forceps may determine the choice and the extent to which it may be carried. The rule that the forceps may be applied in any case where the narrowing is not too great to apply them would make a limit of about three and one-half inches for some, and two and three-quarter inches for the more skilful or fortunate. And similarly version may be employed under the conditions mentioned above in any case where the forceps can be applied, but cannot make the head engage.

CHAPTER XV.

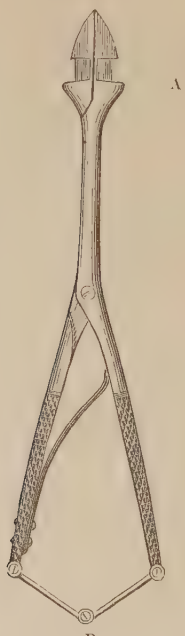
EMBRYOTOMY.

The use of the forceps and version are, in intent, the conservative operations of midwifery. By them we endeavor to withdraw a living child from an uninjured mother. Whenever we find that this cannot be done, the question arises as to whether we shall mutilate the child in order to save the mother, or mutilate the mother to save the child. The former involves certain death to the child, the latter gives both a chance, but only a chance, since neither will be saved with certainty. The mutilation of the child is called embryotomy, but this title has come to be applied only to the mutilation of its body, as in an impacted transverse presentation. When the head is mutilated, the operation is known generally as craniotomy, which includes or is associated with other procedures, called cranioclasm and cephalotripsy.

Craniotomy.—In performing this operation the woman is to be placed in the position for applying the forceps. The first step is the *perforation* of the cranium by means of a perforator. There are many forms of this instrument. Smellie's scissors, the one most commonly used, is the most inefficient of all. With a well-ossified head the blades cannot be opened to cut the bone with one hand, and the operator can

only spare one hand, the other being required to guard the maternal tissues. All things considered, the best is the Simpson modification of Naegele's perforator, which can be introduced firmly locked by a knee-joint lever, and afterwards used with great power by one hand, the lever being reversed (Fig. 24).

FIG. 24.



Simpson's perforator. A, the guard; B, the lever.

The perforator is to be grasped in the right hand, and its point laid flatwise upon the palmar surface of the index and middle fingers of the left hand. All sharp edges being thus guarded, it is to be car-

ried into the vagina, and the point placed against the fœtal head. A suture or fontanelle is the part most easily perforated, but the most central and dependent part of the cranium is the best place to make the perforation if the bone is not too thick. With the fingers of the left hand placed opposite each edge of the cutting blades, the instrument is to be firmly pressed against the cranium with a rotary boring motion, until it succeeds in penetrating it. An assistant should steady the head by supra-pubic pressure. The operator must be prepared to restrain the onward movement if the instrument should slip or glance from the head, and with the fingers also guarding its edges, no harm can be done to the mother. The perforator having entered the head, is to be pushed on until arrested by the projecting guard on each blade, which enables us to know that the blades have entered far enough. The handles are now grasped firmly with the lever thrown out, and an incision as long as possible is to be made in the bone. Closing the blades they are to be turned at right angles, and another incision made across the first. A large opening being thus secured, the perforator should be thrust deeply into the brain, and revolved so as to stir and break up the brain into small fragments. It is a singular fact that the head can be much more compressed when the brain is broken up than when it preserves its form. The destruction of the brain may also be accomplished by means of a blunt hook or crotchet, Fig. 25, if the perforator will not reach far enough. In some cases these steps are sufficient. We may then hook one or more fingers into the perforation and endeavor to

extract the head. The cranial vault will usually collapse as the traction proceeds. Instead of the fingers a blunt hook may be inserted into the perforation, and used to make traction, the utmost care being taken to guard against its slipping and injuring the mother. The crotchet is very seldom of use, and its hold always insecure, but it may occasionally do some service. If the head is firmly ossified, we may succeed better by reapplying the forceps, which may now compress the head more efficiently. In

FIG 25.

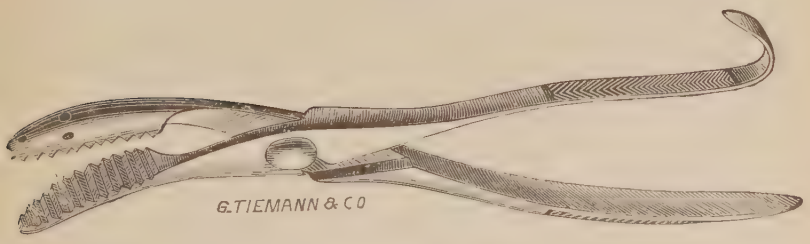
Blunt hook and crotchet combined.

one case I have witnessed the success attending a combination of these measures. While one physician made traction with the forceps applied after craniotomy, I inserted a blunt hook into the perforation and made traction at the same time. The child was in this manner extracted, and the parietal bones were found to be splintered into thin strips,

so great was the force applied. The woman made a good and speedy recovery, showing that the splintering force could scarcely have proceeded from the pelvic walls, which must, in such case, have been considerably bruised. While the traction with the blunt hook elongated the head, the forceps not only compressed it, but warded off some pressure from the maternal tissues. I would, therefore, suggest this double traction as likely to prove effective in many cases, and especially when the head is firmly ossified, as in this instance. Should simple perforation and destruction of the brain be insufficient, the brain may be removed altogether, by washing out the cranial cavity with a stream of water. This is not of the service which would, *à priori*, be expected. Not much room is gained, and it is well to proceed at once to cranioclasm if still unable to deliver.

Cranioclasm.—This operation consists in removing the vault of the cranium, piece by piece, by

Fig. 26.



Craniotomy forceps.

means of a cranioclast, or craniotomy forceps. I can speak with confidence of the superior merits of one similar to the instrument figured in Fig. 26, but

with the blades permanently joined. It has alligator-like jaws and a secure grip, and can be worked easily. Instruments made in two pieces, to be applied separately, and locked like the obstetric forceps, are admirable in theory, but exasperating in practice. When a single hold is all that is desired, the separable instrument is well enough, but when it must be frequently inserted to remove small pieces of bone, it is necessary to have a forceps with the blades permanently adjusted together. Before using the cranioclast we should dissect up the scalp from the cranium as much as possible, so that it may afterwards serve as a cover for the sharp edges of bone that may be left. We then introduce the craniotomy forceps in such manner that one blade will enter the cranial cavity through the perforation, while the outer blade glides between the outer surface of the skull and the scalp. We then seize the bone, a parietal preferably, and taking as large a hold as possible, endeavor by a twisting and pulling motion to disarticulate and withdraw it; or, failing in this, to break off as large a piece as possible. Meantime two fingers of the left hand are diligently guarding the maternal tissues, and when a piece of bone is ready for removal, should endeavor to cover its edges as much as possible during its withdrawal through the vagina. This process is to be repeated carefully and deliberately until the vault of the cranium is removed. We may then expect to tilt the base of the skull on edge and withdraw it, the face giving the best hold for the forceps. The crotchet is of more service here in making traction than in simple craniotomy, but with a good craniotomy forceps no

other instrument is needed. We may also at times twist the scalp into a rope, and with the forceps make sufficient traction to deliver it. In simple perforation and traction, or craniotomy proper, there is no inherent danger to the mother; harm can only be done by carelessness. But in cranioclasm it is impossible to avoid some bruising of the maternal tissues from the necessary manipulations, while the detached pieces of bone cannot always be prevented from rude contact with the vagina. When the head does not engage in the inlet, because of oversize or pelvic deformity, the cervix uteri, while dilatable, is not fully dilated, and hangs flap-like in the vagina; the "purse-mouth" cervix, as it has been called. It is evident that this can scarcely escape injury from the frequent pressure, bruising, and scratching to which it must be subjected. Careful handling will reduce these risks to a minimum. Craniotomy, and still more cranioclasm, are more difficult of performance upon the after-coming head. The principle of operation is the same, the difficulty being in the narrowing and obstruction caused by the child's body.

Cephalotripsy.—To avert some of the dangers inherent in the operation of cranioclasm, the cephalotribe has been devised. This is an instrument made like the obstetric forceps, but with thick and very powerful blades and handles, and having a screw attachment, which enables it to compress the head with great power. As good a form as any is the cephalotribe of Hicks, Fig. 27. When the blades are closed they are nearly in complete apposition, so that a head placed between them would be

crushed to a very thin plate if it did not slip from between them. This is very apt to happen in spite of some spikes on the inner surface of the blades. It is also true that in the very cases where the instrument would be most desirable it is difficult or impossible to apply it, on account of the size of the

Fig. 27.

Hick's cephalotribe.

blades. There are doubtless cases in which it would be useful, but in the hands of any but an expert it is as likely to do harm as cranioclasm. The intent of the instrument is by repeated crushings to reduce the head to a mere sac containing small fragments of bones, in which case it may then be easily dragged through a very small passage. This may be done before or after perforation of the skull. The uncertainty of the instrument, coupled with its expense, is likely to prevent it from ever coming into general use. When we consider that Osborn safely delivered Eliza Sherwood through a pelvis measuring but three-quarters of an inch in the conjugate diameter, there would seem to be little need of an instrument

which cannot be introduced unless the conjugate is twice as large as in that memorable instance.

Embryotomy.—This is the operation required when the transverse presentation has become wedged in the pelvis and cannot be turned. The first step consists in perforation. The perforator is plunged into the thorax with due care, as in craniotomy, and an incision made through as many ribs as possible. It may be advisable to wrench off and remove several ribs, especially if their divided ends tend to project. The viscera are then to be cut or torn into fragments and the diaphragm divided. We then proceed to eviscerate the child, using the craniotomy forceps, crotchet, and fingers, as each may in turn prove serviceable. When the body has been well emptied, we endeavor to bring down the breech, or, failing in this, to drag down the collapsed chest and force it doubled through the pelvis. If delivery is still impracticable, we should pass a blunt hook or fillet around the neck and drag it as near the vulva as possible. This can usually be done without much trouble. Then with a stout pair of scissors, blunt pointed if attainable, we proceed to cut through the neck and sever the head from the body. Then by traction on a prolapsed arm or with a blunt hook in the perforation, we may usually bring down and extract the body, while the head will be expelled with the breech. Various instruments have been invented to facilitate decapitation. The operation is rarely required and a special instrument, while very useful at times, is by no means necessary. The head may not be expelled at once, but remain in the uterus. It may then be extracted with the forceps, an assist-

ant pressing it well into the pelvic inlet during the application of the blades. The amputation of prolapsed members is sometimes recommended, but they are more often useful in making traction than they are in the way.

General Remarks.—This operation and especially cranioclasm, is one as to which the profession has retrograded. In the days of Osborn, Burns, and Denham, cranioclasm was regarded as able to effect delivery in any case where there was an inch of space in the conjugate diameter. Since the publication of Parry's statistics of craniotomy in 1873, and the Cæsarean statistics of R. P. Harris, there has been a growing disposition to prefer the Cæsarean section to craniotomy in pelves deformed to a considerable extent. Parry showed that, when the conjugate measured two and one-half inches or less, the maternal mortality was 38.57 per cent. or more than 10 per cent. greater than the Cæsarean section performed early. The special skill which comes from frequent performance has ceased to be common since we have come to use the forceps earlier and more often, and there are few operations in which skill counts for more. As a general rule, it may be said that when the pelvis is so narrow in the conjugate diameter that the forceps cannot be applied or the hand introduced without difficulty, the operation of cranioclasm will be more dangerous to the mother than the Cæsarean section. This would apply to almost all cases of deformity under two and three-quarter inches in the conjugate diameter, and to some above that measurement. There will be, however, differences in the accessibility of the head, and

in other circumstances, besides also in the skill of the operator, so that the rule should not be too rigid. Rules based upon the size of the pelvis and stated in inches of the conjugate, are onesided and unscientific. It is well enough to fix a lower limit at about two and three-quarter inches in the conjugate with the qualifications already stated, but to fix an upper limit is simply absurd. The fœtal head is of variable size, and occasionally we encounter a case in which it is impossible to deliver a head through a normal or nearly normal pelvis without reducing the size of the head. At least I have found it so on several occasions and with such able assistance that I fear that those who decry the operation as murderous under such circumstances, are more skilled in vituperation than experienced in midwifery. As a matter of fact, when a child cannot be delivered by the forceps or version, all attainable skill having been brought to bear, and there is ample room in which to perform craniotomy, the operation is indicated. Where there is not ample room, the Cæsarean section should be preferred. The question as to the child's life is usually irrelevant. A child cannot be delivered by the conservative operations; it can be delivered by a destructive operation with little if any risk to the mother. He who in such a case saves the life of the mother by prompt delivery cannot justly be accused of killing the child. The killing is incidental to a delivery undertaken to save life, and if this is murder then every stillbirth which follows the use of the forceps, version, or the Cæsarean section must be placed in the same category. Neither version nor the Cæsarean section can

assure the delivery of a living child. Craniotomy in skilful hands and within the limits here prescribed, can promise life to the mother. Here is the plain ground from which no casuistry should drive the practitioner, and he who chooses differently will find as he leaves the deathbed of his Cæsarean case needlessly undertaken, that not all the reports of the brilliant operation in the journals and daily press will save him from the psychical indigestion which comes from straining at gnats and swallowing camels.

To secure the best results from craniotomy it should be done early in the labor. If postponed until the woman is exhausted, it becomes dangerous in almost every case. This furnishes an additional argument for the early use of the forceps, since craniotomy is not to be thought of until the forceps have been attempted. When the operation is begun early we may often allow the woman to rest for an hour or more after perforation, which will be likely to facilitate delivery on account of the moulding pressure of the uterine contractions. In the first half of this century it was customary to wait for twenty-four hours after perforation in many cases. In these days the fear of septicæmia would alone suffice to condemn such a protracted cessation of effort. In deciding for or against craniotomy it is not to be forgotten that the child is not always alive when the operation is indicated. When the utmost powers of the forceps as a compressor and tractor have been exerted for an hour or more, the child is as likely to be dead as alive; and if the operation is demanded because of the failure of version to extract

the head, the child is certainly dead. There can be no possible objection to the operation upon a dead child even in a normal pelvis, except an æsthetic one. It is of frightful appearance. In some cases of placenta prævia, prolapsed funis, eclampsia, and the like conditions, when we are absolutely assured of the child's death, it may be wise to perforate the head for the mere ease to the woman of the subsequent delivery. The disagreeable nature of the operation is a sufficient warrant that this use of it is not likely to be abused.

It is desirable that we should have some certain means of ascertaining the death of the child. If death occurs before labor, the woman experiences a sensation of coldness and weight in the abdomen, followed by slight symptoms of septic poisoning. The breasts also decrease in size and the abdomen may change its outline. More important and available during labor is the absence of the fœtal heart sounds, when carefully listened for after an interval of at least an hour, and by two observers if possible. The cranial bones become loose and movable, and the skin of the scalp is easily displaced and wrinkled. This, of course, is not to be observed unless death has taken place at least twenty-four hours previously. When another part than the vertex presents we may ascertain the death of the child by the ease with which the epidermis is peeled off by slight rubbing.

Craniotomy should certainly not be performed without a consultation, for many and obvious reasons unless another physician cannot be obtained. It is not often demanded, and a physician may not, in his own practice, have occasion to per-

form it more than once or twice in his lifetime. But it is an operation which in its proper scope is necessary and beneficent, and improvements in other methods of delivery are not likely to banish it altogether. The danger of the present time is that a squeamish pseudo-morality combined with a lively desire to perform abdominal surgery, may so discountenance the operation as to cause us to depart still further from the skill attained by our predecessors.

CHAPTER XVI.

THE CÆSAREAN SECTION.

The operation by which the child is extracted through an incision in the abdomen is called generically the Cæsarean section. The various operations which are grouped under this name are called gastrotomy, gastro-hysterotomy, and gastro-elytrotomy.[1]

In *gastrotomy* an incision is made through the abdominal walls only, for the extraction of the child and other substances after rupture of the womb, rupture of the cyst in extra-uterine pregnancy, and similar conditions. It need not be more particularly described, as it is sufficiently discussed in treating of the next operation.

Gastro-hysterotomy, the Cæsarean section proper, consists in an incision through the abdominal walls and the uterus consecutively, and the extraction of the child through the new-made opening. At least three physicians should be present; one to administer ether, the other to assist the operator; to say nothing of the need for abundant counsel before entering upon so grave an undertaking. Cleanliness is more important than any special measures of antiseptic precaution, but there is no doubt that a solu-

[1] Some writers use laparo instead of gastro, in these words, as laparotomy, etc.

tion of carbolic acid, or of corrosive sublimate, in which to wash hands, sponges, and instruments, will be of service. The instruments required are in singular contrast to the magnitude of the operation; a bistoury and grooved director, some suture material and needles, being all that are absolutely necessary. The room should be warmed to a temperature of 85° F. It will be an advantage if the operation is performed before the liquor amnii is evacuated, since its presence makes the risk less of wounding the child, and facilitates its extraction. All things being in readiness, the woman should be etherized and brought to the edge of the bed, or, if practicable, placed upon a table. The operator should stand on the left side of the woman looking towards her feet, as more convenient for making an incision from below upwards. An incision is then made in the linea alba for at least six inches, beginning a hand's breadth above the symphysis pubis and going up as far as necessary to give ample room for extracting the child. While incising the successive layers, it must be remembered that the bladder sometimes is pulled up during labor to a surprising extent, and the operator must be on the lookout for it. The tissues are divided on a director until the abdominal cavity is reached, bleeding vessels being secured when necessary. A small opening is to be avoided, as cramping and hindering rapid extraction, and without lessening the risk. In a successful case by Fourrier, the incision measured fourteen inches. When the womb is exposed its surface should be carefully examined, in order, if possible, to determine the situation of the placenta, which usually

causes a slight elevation above the common level. If it should occupy the anterior aspect of the womb, it will be very unfortunate, since, if cut into, the hemorrhage will be profuse, and interfere with the succeeding steps. It is well, therefore, to begin the uterine incision near the cervical segment, where the placenta will not likely be attached. The finger is then to be introduced and used as a guide through the rest of the incision. If the placenta can in any way be avoided, it is well; if not, it must be boldly and rapidly cut through, and the child extracted quickly, for the hemorrhage will cease only when the womb is empty and contracted. When the membranes are exposed they are to be torn through, the child seized by the feet and withdrawn. If an arm is taken hold of by mistake, it makes in effect a transverse presentation, and delays the extraction. The forceps may sometimes be used to advantage, and should be in readiness. As soon as extraction is finished, the cord should be tied and cut, and the child handed to a nurse or other assistant, the operator confining his attention to the mother. The placenta may be left for a few minutes, to allow the uterine contractions to separate it, or it may be at once detached and withdrawn. This may usually be done by the vagina, and, if so done, it diminishes the risks of fluids being poured into the abdominal cavity. During the operation the assistant, while keeping the wound open, should endeavor to prevent the escape of blood and liquor amnii into the abdomen, and after the extraction of the child, all fluid which may have eluded his vigilance is to be removed. The womb when emptied becomes con-

tracted and condensed, and thus closes the uterine wound. This may continue closed, but to make sure that it shall not gape and permit the discharge of blood or the lochia into the abdominal cavity, it should be closed by sutures. The material for sutures may be left to the predilections of the operator. Silk is the most convenient, and when clean appears to be innocuous. A sufficient number of sutures should be applied to close the uterine wound completely and neatly, and they may be cut off short, with the expectation that they will in due time be absorbed without disturbance. The abdomen being surely clean and dry, the external incision is then closed in like manner, and suitably dressed, according to the general principles of abdominal surgery, which will also govern the after-treatment of the case. Considered simply from an operative standpoint, the woman is then in as good plight, or better, than after an ovariotomy, there being no risk from a sloughing pedicle. If patients do not do as well after this as after ovariotomy, we must find the reason in the sudden and unprepared performance of the uterine section, and in the exhaustion and bruising incident to previous attempts at spontaneous delivery. There is also some danger of a discharge from and through the uterine incision, even when apparently well sutured.

Porro's Modification.—Hoping to prevent the ill-results from the uterine incision, Blundell, experimenting upon rabbits, found that the removal of the womb after gastro-hysterotomy was followed by recovery in three cases out of four. To state his claim in full, "in securing the vagina and removing the

uterus we are substituting a wound well secured and of smaller extent, for one that is larger and not secured by ligature at all;" it not being the custom at that time to close the uterine wound by sutures. Storer, of Boston, first performed it on the human female to check hemorrhage. Porro having systematized it, the operation has been performed about a hundred times; at first with great success, but of late with no more, or only as much, as attends simple gastro-hysterotomy. It is to be performed as follows:

After the fœtus has been extracted through the uterine incisions, the womb is to be constricted by an écraseur, at about the level of the os internum, and so as to include above it the ovaries and oviducts. These, with the womb, are then removed with curved scissors or the knife. Two long steel pins, five or six inches long, should then be made to transfix the stump so as to hold it out of the abdominal incision. A stout silk cord is then to be tied tightly in the line of the écraseur, which may then be removed. The abdominal incision is then to be closed, the stump being fixed in the lower angle of the wound.

Instead of this, the womb has been amputated by a V-shaped incision, the edges united by sutures, and the stump replaced in the abdominal cavity. This has so far not worked well, and is a departure from the original intent of the Porro modification. Müller proceeds by making an abdominal incision sufficiently large to permit the uterus to be lifted out before it is incised. The écraseur is then applied in the line of the os internum, and the uterus

well constricted. This permits an incision into the uterus with much less hemorrhage than in the other forms of operation. When the fœtus has been extracted, the operation proceeds as in the Porro method. This certainly promises well, and when performed in large cities, with an abundant supply of assistants and instruments, may be expected to give good results. Under ordinary circumstances it is doubtful whether it is of any more value than simple gastro-hysterotomy, with a well-closed uterine wound and carefully watched drainage.

Gastro-elytrotomy.—This is another modification of, or substitute for, the Cæsarean section, which was suggested and imperfectly performed years before it was finally accepted. It was first successfully championed by T. G. Thomas, and has been repeated by others. The object of the operation is to avoid opening the abdominal cavity at all. An incision is made parallel to the line of Poupart's ligament on one side and close to it. The tissues are cautiously divided until the operator reaches the peritoneum. Carefully keeping to the outside of that membrane the tissues are to be dissected until he reaches the vagina, near to its insertion upon the womb. A small incision is now made in the vagina, which is to be enlarged by tearing. The hemorrhage is apt to be profuse, and this, while a drawback to the operation, can be partly obviated by cutting as little as possible, and enlarging the opening by stretching and tearing. A sound passed into the vagina and held by an assistant, will help in determining the point at which the opening is to be made. The os uteri may now be drawn into the incision with the

presenting part of the child. If the os is not dilated, it may be stretched with the finger or rubber dilators. With forceps or version the child may then be extracted through the iliac incision. The placenta is expressed in like manner, after which the incision is to be closed with sutures. In one case (Gillette) it was necessary to perforate the child's head and extract with the cephalotribe, the mother making a good recovery. A perforated drainage-tube is recommended by Thomas, to be placed in the wound and carried through the vagina. Although it has been performed only by very skilful operators, the bladder has several times been wounded, and in general it may be said that it requires much more surgical skill than the Cæsarean section. While this to a certain extent equalizes its risks with those of gastro-hysterotomy, it is still so superior in theory that it should continue to be performed until we have large practical records of its capabilities. An important contra-indication to its use is an undilatable condition of the os uteri, full dilatation being essential to success. For this reason it can only be done after labor has been in progress for some time.

General Remarks.—Formidable as this operation appears, it is, when properly performed, less fatal than craniotomy in badly deformed pelves. R. P. Harris finds that in this country the general average of success has been $41\frac{2}{3}$ per cent., to which we must add the lives of some children saved. But when early performed, as an operation of choice and not as a last resort upon an exhausted woman, the percentage of recoveries rises to 75 per cent. It is, therefore, essential that the operation should be

done as soon as possible and not after allowing the woman to be in labor for several days. And since it is an operation in no wise dependent upon the natural efforts, it is well to fix the time for its performance as we would for any other surgical procedure. This should be as near as possible to the end of gestation, in order that the child may be in good condition. With the same care that is bestowed upon an ovariotomy there is no reason why the Cæsarean section should not in this way succeed as well. Unfortunately, we cannot always choose when to operate.

We may then define the scope of the operation with some distinctness. Craniotomy performed early is innocuous to the mother in the normal or slightly deformed pelvis. We reach the danger line at a contraction of two and three-quarter inches in the conjugate diameter. From this point on, the Cæsarean section is safer and should therefore be performed. This rule is of course to be modified by the operative skill of the physician, the circumstances surrounding the patient, and other contingencies. This has been sufficiently discussed in the chapter on embryotomy. Another phase of the question may be adverted to. While I would hold that the physician should not subject the woman to the dangers of Cæsarean section when craniotomy can be easily and safely performed, I would as freely admit that he should urge its performance when craniotomy promises to be difficult to accomplish, whether the pelvis is much deformed or not. Embryotomy upon an impacted transverse presentation may be a difficult and dangerous proceeding, even

in a nearly normal pelvis. An occipito-posterior or facial presentation may so persistently fail to enter the inlet as to make craniotomy a very hazardous undertaking. It is easy to conceive that in such a case the physician might subject the woman to less risk by the Cæsarean section than by the destructive operation. *Per contra*, there are cases of notable pelvic contraction where craniotomy may nevertheless be easily and speedily performed. To decide such matters by mere pelvic measurements or to criticise a physician for performing the Cæsarean section in a woman who subsequently gives birth to a living child *per vias naturales*, is unjust. These matters are to be decided at the bedside and with due consideration of all the attendant circumstances, and not by measuring-tapes in the library.

When we are in doubt as to whether craniotomy or gastro-hysterotomy would be the proper operation, the prospect of saving the child should be allowed to decide, but only in such doubtful cases. It is by no means certain that the child will survive. The circumstances under which the extraction is undertaken, the possible wounding of the placenta, the neglect which the child is apt to experience in the excitement of the time, are unfavorable to its life, and it is not unfrequently stillborn, or of such weak vitality that it does not long survive. Delay in operating must often change the decision. A case in which one would have unhesitatingly operated, if called to early in the labor, may be rendered unsafe by the long continuance of the labor, while the child's head may have been so moulded

and softened that it becomes comparatively easy to extract it by craniotomy.

Post-mortem Delivery.—The Cæsarean section may sometimes be performed immediately after the death of the mother to save a child whose heart beats can still be heard. In some countries of Europe it has been the law that the bodies of pregnant women dying of disease or accident must be opened, if only to administer baptism to the child. If it is performed, it should be done with the same precautions in all respects as if the patient were alive. Velpeau records a case in which a physician delivered a woman supposed to have been dead for two hours, by version. She afterwards revived and lived for several years. On account of the uncertainty of determining death, it is much better to deliver by forced dilatation, version, and extraction through the vagina than to perform the Cæsarean section. When the former is impracticable, we should not hesitate to incise if there is any reasonable probability of the child's life. Duer, in his paper[1] on this subject, states that it is possible to deliver a living child within two hours of the death of the mother. Much depends on the nature of the fatal malady. When it does not necessarily affect the fœtus injuriously, the limit may be extended even longer. This is suggested by the following cases:[2] In 1850 a young woman in Berlin buried her newly born child, believing it to be dead. It was exhumed after an hour and resuscitated. Another young woman was delivered alone and in a state of unconsciousness at

[1] Amer. Journ. Obstet., January, 1879.

[2] Braithwaite's Retrospect, xxxi.

4.30 A. M. Coming to herself and finding the child cold and presumably dead, she wrapped it up in her apron and buried it in the garden with the afterbirth attached. At 9.30 A. M. the child was disinterred, and after two hours work was resuscitated.

SYMPHYSEOTOMY.—This operation was first performed by Sigault in 1777, being intended as a substitute for the Cæsarean section. After a full and widespread trial, it was definitely abandoned as causing unjustifiable injury. Attempts are occasionally made to revive it, but, it is to be feared, more from the hope of notoriety than for the benefit of humanity. The operation consists in the division of the symphysis pubis. The two sides are then separated with the object of increasing the antero-posterior measurements of the pelvis. The amount of room gained is surprisingly small. According to Churchill, it requires a separation of four inches to increase the conjugate diameter a half inch. In many cases, especially in deformed pelves, no adequate separation can be effected, and besides, the bladder is almost surely injured in case of wide separation. The necessary pressure is apt to be followed by necrosis. A permanent mobility of the articulation may render the woman a cripple, and for these reasons it has been wisely put upon the shelf as an ingenious but impracticable device.

CHAPTER XVII.

PREMATURE LABOR.

The induction of labor prematurely is an approved obstetric resource under some conditions. It will be well to take first a brief survey of the causes, clinical history, and management of premature labor when spontaneously brought about. Three terms are used nearly synonymously: abortion, miscarriage, and premature labor. They date back to the days when it was supposed that a fœtus was not living until it had "quickened" during the fourth or fifth month. Its expulsion before this period was known as an abortion; miscarriage being applied to its expulsion after quickening and before viability, and premature labor after it had become viable, or at any time after the seventh month. Nowadays abortion is a word so often coupled with "criminal" that it has fallen into ill-repute, and miscarriage is used as a euphemism by both professional and lay persons. Although the old idea was not only incorrect but pernicious, the distinction is one which, with slight modification, could be maintained on clinical grounds. For in the first third of pregnancy the ovum is discharged entire and without much difficulty, because of the tenderness of the new formed placental connections. During the latter third of pregnancy, labor differs but little from the same process at full term. But during the

middle third, the placenta is tenaciously adherent and its separation often becomes a matter of great difficulty.

Causes.—The causes of abortion are ovular and maternal. An ovum is extruded prematurely for the same reason that it is discharged at full term; because it becomes a foreign body in the uterus, and thus excites uterine contractions. This may be due to disease of the placenta and membranes, to separation of the placenta by hemorrhage or violence, or to the death of the fœtus. On the other hand, the womb may be excited to contract upon a healthy ovum and thus detach it. The fœtus is subject to most of the diseases which affect the adult. Its death does not necessarily precipitate labor, but it is seldom long retained when dead. If the circulation in the placenta and decidual membranes is arrested by the death of the fœtus, its expulsion will not be long delayed. If its death is not incompatible with a continuance of the vascular connection between the womb and the fœtal envelope, it may be retained for months, but not beyond the natural term of gestation. This is known as missed abortion. It has been alleged that this retention may continue for months beyond the usual term of pregnancy, but such instances may be safely set down as cases of extrauterine gestation or as due to imperfect observation. The subject is one of medico-legal interest, since the passage of a fœtus of three months development, six months after the absence of a husband, is a suspicious circumstance. Such a claim might be allowed, but after more than 280 days of absence, the passage of a fœtus of but a few

months' development, would require an amount of evidence which has never yet been given satisfactorily in any case. Abortion from the death of the fœtus alone is not common.

Inflammation of the placenta and membranes not infrequently occurs, and may be found as a cause of the accident. The placenta is subject to fatty, amyloid, and cystic degeneration. Syphilis is responsible for perhaps the greater number of these degenerative changes. They act by practically destroying the connection between the ovum and uterus, as well as by finally destroying the child. Hemorrhages may occur in any period, causing placental apoplexy. This is not necessarily associated with disease, and may be caused by sudden uterine hyperæmia. The latter is a prolific source of abortion. Excessive exercise, coitus, the use of the sewing machine, heavy lifting, displacements of the uterus, and pelvic tumors may, by developing uterine hyperæmia, lead to engorgement and rupture of the placental vessels, or may directly provoke uterine contractions. Emmenagogue drugs may act in the same way. Contractions may also be excited by mental shock or emotion, and by high temperature in fevers. Any disease in which the fever runs high is liable to bring on an abortion, and for this reason malarial fevers are a common cause. Injuries to the womb itself may be slow to awaken contractions, there being a wonderful tolerance in this respect during pregnancy. Underhill reports a case in which a young woman, three months advanced in pregnancy, attempted to pass a bent and hooked knitting-needle into the womb. He found it caught

in the os internum, from which she was endeavoring to pull it. There was considerable hemorrhage, but no abortion followed. Ovariotomies are sometimes performed with impunity during pregnancy.

A large proportion of the abortions encountered in practice are the result of violence done to the ovum. The woman may attribute it to falling down stairs or overwork, when in reality an operation has been performed by herself or an accomplice. The prevalence of criminal abortion is so great that every physician should regard it as a part of his duty to remonstrate with those to whom he is called, concerning the impropriety of a practice which was regarded as infamous even by Juvenal. Apart from any consideration of its wickedness, the physician should remember that in some States he may be held as an accessory after the fact, if he attends a woman upon whom a criminal abortion has been produced without giving notice to the authorities. Neither is it a dignified role complacently to complete the work of some scurvy abortionist, and it may also be added that these cases are among the most disagreeable, time-consuming, and care-producing, that we are called upon to attend. In case of death following an abortion, for which he is sure a criminal cause exists, the physician should protect himself by demanding a coroner's inquest.

Clinical Course.—Abortion may begin as suddenly as labor, and the nearer to full term the greater will be the likeness in all respects. It is apt to come on at what would otherwise have been a menstrual period, because of the recurring pelvic hyperæmia which comes monthly, even when there is no menstrual

discharge. Commonly it is preceded by more or less steady pain or at least discomfort in the back and hypogastrium, because of the pelvic hyperæmia which attends it. To this succeeds the intermittent pain of the uterine contractions. The unprepared condition of the uterus makes the contractions at first feeble and infrequent, but they soon gather strength, rarely, however, being as close together as in normal labor. The pains are usually more severely felt; the woman, if a multipara, being apt to declare that she would rather have a real labor than this. Hemorrhage begins as soon as any part of the placental attachment is severed and the membranes are loosened, so as to open the way to the os uteri. The abortion may begin with hemorrhage, especially if the result of violence in any way. Sometimes a slight oozing of blood is noticed for some days or even weeks before the abortion occurs.

The cervix is slowly dilated by the uterine contractions until large enough to expel the ovum or fœtus. While this is usually a slow process, especially in the early months, it may happen with some suddenness, so that it is never safe to make predictions as to the length of time required. The power of the cervix to dilate actively is sometimes remarkably shown during abortion.

During the first third of gestation the ovum is usually extruded entire as soon as the cervix is sufficiently dilated. It is then voided from the vagina by bearing-down efforts. During the middle period of gestation the membranes more commonly give way, and the fœtus is thus expelled. The placenta follows rather slowly, even if the cause of the mis-

carriage is disease of the placenta, and if it has occurred with a healthy ovum the placenta is likely to remain until forcibly removed. Meanwhile hemorrhage is likely to occur, owing to a partial separation, and may be fatal in amount. When abandoned to Nature, the placenta may remain until detached by the sloughing process, or in a few cases may remain without causing any harm for several weeks or months. The retention of the placenta constitutes one of the greatest dangers of an abortion, and is liable to be accompanied with peritonitis, and other inflammatory conditions, and septicæmia, besides the continued risk of hemorrhage. It is not likely to occur in the last three months of pregnancy, nor so frequently in the first three, but is almost the rule in the middle period.

There are sometimes puzzling variations in the course of abortion, especially in the nature of the expelled product. An early ovum is often expelled during the first month or six weeks, with a mass of clots and blood, and may be thrown out without having been observed. We can then only infer the fact of abortion from the unusual hemorrhage without other adequate cause. Even as late as the second month the ovum may not contain a fœtus, its delicate tissues having been completely macerated and dissolved in the liquor amnii during the time which has elapsed since its death. Should the membranes have ruptured and the collapsed sac alone be subject to inspection, the microscope may be required to discriminate between this and an exfoliation of uterine mucous membrane, such as is thrown off in some abnormal conditions.

A very interesting variation is the *fleshy mole.*

This consists of a portion of the ovum enmeshed with stratified blood clot. It must be carefully distinguished from a mere blood clot, which, when long retained, presents a whitened, lamellated appearance, from the partial loss of its coloring matter and stratification of the fibrin. The true mole contains a cavity lined with the glistening amnion, and in some part of its structure chorionic villi can surely be detected. Its history usually is, that the woman in the first, second, or possibly third month of pregnancy had a uterine hemorrhage after heavy lifting, a fall, or blow, or violence of some sort. Afterwards a more or less continual oozing has taken place, until the abortion has finally occurred several weeks, or perhaps two or three months after. In such a case a placental apoplexy destroyed the ovum, but some vascular connection remained intact, and the ovum maintained a slight vitality for some time. As the blood gradually escaped from time to time, successive layers of clot were added to it. The fleshy mole, as usually passed, varies from the size of a hen's egg to that of a goose's.

Cystic degeneration of the chorionic villi, or false hydatids, gives rise to small bodies, which, when voided from the womb and placed in a basin with the accompanying bloody fluid, have been aptly compared to "white currants floating in red currant juice." This peculiar growth is usually accompanied by the death and disappearance of the fœtus, and by the sudden enlargement of the womb, the cysts proliferating at a more rapid rate than the normal ovum. A more or less continuous discharge of watery fluid, often tinged with blood, usually precedes and accompanies their discharge.

Treatment.—The prevention of an abortion when the process has actually begun, is not always or often possible. Much depends upon the nature of the provoking cause, which should first be inquired into minutely. If the membranes have ruptured, nothing can be done to arrest it, unless the opening is small and remote from the os uteri. In such cases the tear has been known to close up after the loss of a considerable amount of liquor amnii; but if the opening is at the os the abortion in inevitable, and should be promoted instead of hindered. Little dependence can be placed upon rules based on the amount of hemorrhage or of the dilatation of the cervix. The cervix may admit one or two fingers, and several ounces of blood may have been lost, and yet the pregnancy may be continued until full term. Whenever, therefore, we cannot determine the cause, or have any doubt as to the possibility of arresting the abortion, we should endeavor to prevent it. For this purpose full doses of morphia and absolute rest are the most efficacious. When the cause is of malarial origin, quinine should be administered freely with morphia. Displacements of the uterus should be replaced if present. Preventive treatment is more successful when applied to cases in which abortion is feared because of its occurrence in former pregnancies.

A woman with syphilis may have repeated abortions, and in this disease the physician has almost absolute control. When the placenta is found to present the fatty or amyloid degeneration, and syphilis may be excluded as a cause, the chlorate of potassium is highly recommended as a prophylactic in

subsequent pregnancies. When no cause can be found for successive abortions, they are said to occur from habit, which explanation may serve until we can ferret out the actual cause. In these cases viburnum prunifolium is said by Jenks to be of service. If a woman usually aborts at a particular time she should remain in bed, or at least refrain from active movements until the dangerous period is passed, whatever medication may be used in addition.

The treatment of an abortion is substantially that appropriate to a case of labor, but two conditions will specially demand our attention. The first is hemorrhage, which occurs in the majority of cases; the second, retention of the placenta. Hemorrhage is liable to continue until the ovum is completely expelled, and may be dangerously profuse at any time. The plain indication then is to empty the womb, but if this is impracticable owing to the want of cervical dilatation, we must apply a tampon. The tampon properly adjusted (see page 153) is a very effective safeguard, and usually aids in the dilatation of the cervix. When the os uteri is sufficiently large, and the ovum beginning to press through, we may often complete the delivery at once, by making firm pressure upwards upon the anterior or posterior lip of the os, or upon each one alternately. This both excites uterine contraction and aids in the retraction of the cervix over the ovum.

Retention of the placenta is not so easily managed as hemorrhage. Some differences of opinion exist in the profession as to the length of time we should wait for the spontaneous expulsion of the placenta. The majority of recent writers advocate the immediate

removal of the placenta; that is, without waiting more than a few hours at least. The reasons for this are based upon the dangers of retention, the frequent incompetence of the uterus to effect delivery, and the comparative ease of the removal while the cervix is still well opened, and before it has contracted, as it speedily will after the fœtus is expelled. It is not denied that in cases left to Nature the placenta is often expelled, or more easily removed, after the lapse of twelve or twenty-four hours. The practice of immediate removal implies that the risk in waiting is too great to allow us to depend upon a favorable spontaneous termination. This view is, on the whole, correct, but it should not lead us to too frantic efforts in the removal of the placenta. It must be supplemented with the knowledge that we may do more certain harm by violence in the attempted removal than might have resulted from a prolonged retention. With this proviso, we should endeavor diligently to make the delivery complete after the expulsion of the fœtus. Expression of the placenta should be attempted, as in normal labor, which will at least promote useful uterine contractions. Should this fail, we may pass one or two fingers into the uterus, which at the same time is to be pressed down to meet the fingers by a hand on the mother's abdomen. We should then endeavor to dissect up the placenta by a to and fro motion of the finger, not stopping except to rest until the whole placenta is detached. The prime mistake usually made is to dissect up a small area, and then attempt to drag it out. Only a fragment will come away, and every piece so withdrawn renders it more difficult to re-

move the rest. When we have detached the placenta altogether, or as far as we can reach, an attempt may be made to withdraw it with the fingers. If it does not come readily, the placental forceps, of which there are many patterns, may aid us. The forceps should not, as a rule, be used until the placenta is detached. If we are so unfortunate as to leave a portion in the uterus, we must again endeavor to detach it with the finger, forceps, or curette, in the latter case using the dull wire curette of Thomas, and not a sharp cutting instrument. In this way we may persevere until the placenta is completely removed, or until our judgment is convinced that further manipulation would be injurious. When much trouble has been experienced in removing the placenta, or when a part must be left behind, it is well to inject a slightly diluted solution of tinct. iodinii into the uterus, both as a preventive of hemorrhage and as an antiseptic measure. In any event a vaginal douche of hot water will be both beneficial and comfortable to the patient as soon as the affair is over. Ergot is especially to be avoided until the womb is emptied, when it may be given if the physician is so disposed. Before complete delivery, its only action is likely to consist in hindering either the natural or artificial expulsion of the retained placenta. When the placenta cannot be entirely removed, the woman is to be protected against septicæmia by a continuance of antiseptic injections. Frequent vaginal injections should be given, and should the slightest ill-odor be perceptible, intrauterine injections must also be administered. From time to time the uterine cavity is to

be gently explored to determine whether the fragment is ready to be extracted. If but a small portion remains, it may be trusted to come away in minute instalments.

The risks of inflammation and septicæmia are not entirely dependent upon the complete expulsion of the ovum. The womb or vagina may have been lacerated by the knitting-needle or other tool used to induce the abortion. Powerful emmenagogues may have been taken with effects other than those made evident by the abortion. The case must, therefore, be narrowly watched and more care bestowed than after an ordinary labor. Involution is longer delayed, and many cases of areolar hyperplasia, versions, flexions, and inflammations may be traced to an abortion as their exciting cause. On the other hand, the woman is apt to consider an early abortion as a trifling episode, and to deem it unnecessary to stay in bed half as long as after a labor at full term. The physician should, therefore, be positive in his directions, and unremitting in treatment until the accident is fully recovered from.

Indications for Inducing Labor.—The artificial induction of labor by the physician has not a very wide range of legitimate employment. Its main purpose is to deliver through a deformed pelvis a child which will be smaller and softer than at full term, but which can live. Tumors of the uterus or pelvis which obstruct delivery, may also demand the operation, especially cancer of the cervix. For the same reason it is well to abridge the gestation when in successive pregnancies the children have been very large, especially if craniotomy has been neces-

sary. We may in this way succeed in extracting a living child. Continued hemorrhage early in the course of a case of placenta prævia is a sufficient warrant for inducing labor, since the mother and child are alike in jeopardy while the pregnancy continues. The same is true of eclampsia of uræmic origin at any time in the pregnancy. Nature usually takes the initiative, but, if not, the labor may be precipitated if we cannot at once gain control of the unfavorable symptoms by appropriate medication. There are occasionally met with cases in which the woman carries a child without accident until the last month of gestation, when it invariably dies and is stillborn. When this has happened several times in succession, we should induce labor before the fatal period. Denman recorded two successful instances of this kind, and others have since been observed. When the fœtus for any cause has died, and being retained has given rise to symptoms of septic poisoning in the mother, labor should be induced. It has also been recommended for the relief of excessive vomiting, but this is clearly improper. The child usually does very well and may be born without any trouble at full term, so that the induction of premature labor for this cause might destroy the child. This can scarcely be said to be ever necessary for the relief of vomiting, and it ought not to be undertaken before the period of viability.

The Operation.—Many ways have been tried for this purpose, which are for the most part imitations of the natural course. The common method of the abortionist, to rupture the membranes, is sure

enough, but apt to be slow and dangerous both to the mother and child. The nature of the case may determine the particular method, the best being the one which enables us to operate at a fixed time. The following will generally succeed. A flexible bougie is to be cautiously passed into the womb and insinuated between the membranes and the uterine walls. As it is pushed on, it detaches the membranes to a certain extent. When all but an inch or so has entered the womb, a large pledget of cotton with a string attached is to be placed at the os uteri, to retain the bougie in place. This may be done in the afternoon or evening. By the middle of the next forenoon uterine contractions should be fully developed, and some dilatation of the cervix already accomplished. The bougie and cotton will be spontaneously expelled or may be withdrawn. When contractions are present, the remaining steps are in our own hands. Barnes's or Molesworth's dilators are to be introduced if necessary, and the dilatation completed, being careful to preserve the membranes intact until then. When dilatation is complete, we may await the effect of the uterine contractions, but it will usually be better to deliver forthwith by version or the forceps. This programme may fail from the ineffectiveness of the bougie in awakening contractions, in which case it should be tried again. When performed at the end of the eighth or ninth (lunar) month—and it is seldom indicated sooner—it may be said to be nearly devoid of risks for the mother. The child incurs some dangers apart from its delivery through a narrowed pelvis, or from the other conditions demanding the

operation. It will be more feeble and less able to maintain its bodily warmth. For this reason several devices have been made to assist it in this respect. T. G. Thomas recommends that the child be wrapped in cotton batting and placed in a tin box, which in turn is placed in a larger tin vessel, through which warm water can be made to flow. In this way the child can be kept at a uniform temperature. It should be fed from a spoon or with a rubber nipple which requires very little suction, since even the exertion of nursing is too great for some premature infants. Tarnier and Auvard have used with success an "incubator" of somewhat elaborate construction, which is likely to prove useful in hospital service. The preparations for the child should be made before the operation is begun, so that it can at once be placed under favorable circumstances. In this way a large number of children can be saved, and if we could have due notice of the pregnancy in all cases, many lives now lost by craniotomy or long delay in labor might be born alive.

CHAPTER XVIII.

THE PERIOD AFTER DELIVERY.

The physician is by no means through with his case when the delivery is accomplished and the immediate attentions to the woman and child have been rendered. The post-partum, puerperal, or lying-in period is a time when his supervision is greatly needed and when he can often be of as much service as during the labor. This period is perfectly well defined by its leading feature, the *involution* of the womb or the return of that organ and other structures enlarged during pregnancy to their normal condition. It continues for about six weeks, or, as is implied by Moses, forty days. The researches of Stockton Hough[1] tend to show that the development of a female child is a greater strain upon the maternal organism than when a male child is conceived, and that the period of involution is longer. This also seems to have been anticipated by the Jewish legislator, when he doubled the period of seclusion after the birth of a female.

After delivery the fundus of the womb is nearly at the level of the umbilicus. From this point it gradually recedes until by the tenth day it has retracted to the level of the superior strait, the whole womb being then within the pelvis. During

[1] Amer. Journ. Obstet., 1884.

the rest of the period it gradually diminishes until it has regained its natural size in the unimpregnated condition. The cervix may at first appear to be somewhat everted. This is due to the prompt contraction of the os internum, and the patulous and rather limp condition of the cervix. The involution is effected by a process of fatty degeneration. The uterine muscular fibres and connective tissue become infiltrated with oil-globules and disintegrate. The waste matters resulting are to a slight extent absorbed, to be excreted by other organs, but for the most part are voided into the uterine cavity and thus expelled. This continues until the excess of tissue has been removed and the structure of the womb renovated.

This is accompanied by a discharge from the genital tract, called the *lochia* or cleansings. For the first few hours the lochial discharge is mainly composed of blood, which oozes from the sinuses in the placental region. It is of variable amount, depending principally upon the firmness with which the womb is contracted. Some women lose ten or twelve ounces during the first day; others lose no more than during an ordinary menstruation. Clots form readily at this time and are expelled with the discharge, accompanied by more or less pain. The more thoroughly the womb is contracted, the less blood will appear in the lochia if no lacerations are present. After the first day it diminishes in quantity and gradually loses its redness of color, having usually become of a pale straw color before the fifth day. It has then a peculiar animal odor and is essentially an alkaline serous fluid mixed

with the ordinary secretions of the uterus and vagina. It contains also blood disks and leucocytes, epithelium from the uterus and vagina, and such fragments of the placenta and membranes as may have been retained, with minute shreds of the decidua vera and serotina. Its chemical constituents, according to Winckel, are albumen, mucin; saponaceous fat, chlorides, an alkaline phosphate, iron, and salts of lime. Clinically, it may be regarded as a bland and innocuous albuminous fluid under ordinary circumstances, which, if retained in the uterus or vagina at an elevated temperature, may become explosively poisonous. It will, therefore, bear watching. It continues to flow until the involution of the womb is complete, but after the third week is scarcely perceptible. During the second week leucocytes predominate, and the discharge is of a creamy consistence, giving it the appearance of an ordinary leucorrhœa, after which it gradually becomes clear, as before, and finally disappears.

The obvious source of the lochial flow is the inner surface of the womb, from which it escapes by transudation. The surface of the uterine cavity is lined after delivery by a layer of epithelium, which contains for the must part but few tubules and columnar cells. The tubules and ciliated cells are reproduced during involution. At one point the mucous membrane is very thick, at the placental site, or decidua serotina. It is stated by some that the whole cavity, and especially the placental site, is entirely denuded of mucous membrane after delivery, so that the woman was in a condition analogous to that obtaining after an amputation, with a stump containing

the ends of divided bloodvessels inviting absorption. This is far from true. The line of cleavage in the decidua vera, which separates the ovum from the uterine wall, is not very regular, and the layers which remain are thicker in some places than in others, but no place is entirely bare. A special provision is made to seal the opened vessels of the placental site, by embedding them in a thickened and contractile mass of tissue, which may plainly be seen to rise above the level of the common uterine surface. During involution this patch of thickened tissue gradually disappears, as the mucous membrane regains its usual proportions. The redundant layers are cast off flake by flake, and floated away in the lochial discharge.

The vagina also requires to undergo some involution as well as to recover its elasticity after the stretching to which it has been subjected. The vulva gapes considerably for the first few days, and for a week or more the vagina is unusually roomy, but its calibre is soon restored to nearly if not quite to its original dimensions, if no orificial lacerations exist. There is much individual difference in this respect. I have seen a woman who was a prostitute by occupation, and the mother of several children, whose vagina always closed tightly around the examining finger as in a virgin. This is rather exceptional, but the importance, from a social standpoint, of restoring the tone of the vagina, should make us solicitous to secure a thorough involution for the vagina as well as for the womb. Minute fissures or lacerations of the mucous membrane of the cervix and vagina probably occur with great frequency,

even in normal labors, and a slight tear of the posterior commissure is quite common. During the rapid contraction and condensation of tissue which take place afterwards, they are quickly approximated and healed. They do not do any harm, unless the lochial flow becomes septic, in which case they afford a ready entrance for the poison. They also permit the contagious principles of other diseases to be introduced by the finger or instruments of the physician or nurse.

The pulse and temperature of the lying-in woman present a striking anomaly. The former is reduced in frequency, being abnormally slow, while the latter is higher than the normal. In 1871 I published[1] some records made by Dr. H. C. Hand and myself, of observations on the temperature of women during and after labor. We found a constant elevation of temperature, beginning during the labor and continuing for several days, of from 1° to 1½° F. This was perhaps in part due to an inaccurate thermometer, as the general testimony of subsequent observers is that it does not exceed 0.9° F. The diurnal variations are as under ordinary conditions, but are subject to sudden and unaccountable variations, being unusually mobile in this period. Notwithstanding this fact, a sudden flush of fever should always be looked upon with suspicion, and treated as though it were a precursor of serious trouble. The lowering of the pulse rate is usually to an extent of ten or twenty beats in the minute, so that a rate of sixty beats or less is to be expected. A sudden

[1] Northwestern Med. and Surg. Journal, October, 1871.

acceleration of the pulse has much the same significance as a similar rise of temperature would have; a frequent pulse immediately after labor is a concomitant and sometimes a warning of hemorrhage. Both the pulse and temperature return to the normal standard by the tenth day, the pulse being the last to return, being somewhat influenced by the rest in bed, which is maintained up to that time. The tenth day is, therefore, seen to be a definite stadium in this period, the womb being within the pelvis by that time also.

The bladder is often a little slow in recovering its tone, especially after a labor in which long or great pressure has been made upon it or the urethra. The secretion of urine is increased, and, therefore, if there is a long delay in emptying the bladder after labor, there may be some difficulty in accomplishing it, the want of tone and the distention cooperating to hinder its evacuation. Instructions should always be left to have the woman make an effort to void urine within two or three hours after labor. A warm cloth applied to the vulva will afford some aid. It is rarely necessary to use a catheter if this precaution is taken, and the use of an instrument is to be avoided as a possible source of contagion, nor is it desirable to have the parts manipulated any more than necessary. In urinating the woman should sit upon the chamber placed in the bed, unless she is weak, and even then it is well for her to do so, with some one to hold her and assist her in assuming this position. This permits clots and other matters collected in the vagina to be

passed away, promoting drainage. It is difficult for some persons to urinate in the recumbent posture.

The bowels are usually moved just before the labor, and if anything remains in the rectum it is extruded during the descent of the head. After labor they remain in a state of torpor for several days. Constipation is so common among women at all times, that it is not surprising that it should prevail after delivery, and for an indefinite time if nothing is done to overcome it. Nature has provided in part for this contingency, by the increased flow of urine and the greater activity of the cutaneous eliminating surface. The perspiration is normally increased for several days, but if it should become excessive should be restrained. The bowels should not be interfered with until the third or fourth day, as a rule, when a dose of Rochelle salts, or similar purgative, should be administered if no evacuation has yet occurred. It should not be given as a matter of routine, and an enema may be all that is required. A dose of calomel is often demanded, nor is there anything in the general condition at this time to contraindicate it. The fecal accumulations, so common at the end of pregnancy, can be best evacuated by the use of enemata in conjunction with purgatives.

The breasts now become functionally active, and, to borrow a metaphor from the signal service reports, the area of disturbance which was central in the womb moves into the breasts. During pregnancy the breasts contain a little milk, and immediately after labor some can be pressed from the nipples. This is called the colostrum, and is more viscid and yellowish than the milk which will be

subsequently secreted. It possesses laxative properties, and is probably designed for the purpose of cleansing the child's intestines from the tarry meconium which is present in them at birth. The "coming in" of the milk, or the establishment of the lacteal secretion, is sometimes sudden, but in most women gradual. When the secretion is suddenly established, the breasts quickly grow hard and painful from the distention, and the temperature rises to 103° or 104° F. This febrile state is known as the *weid*, and has been somewhat discredited, since the tendency to attribute every ill to septicæmia has arisen. It usually occurs on the third day, and only when the breasts begin to secrete milk rapidly and violently, if the expression may be allowed. Should this occur the milk should be drawn by a pump, warm cloths applied to the breast, and morph. sulph. gr. $\frac{1}{8}$ to $\frac{1}{4}$, administered with three or four drops of tinct. aconiti radicis. Owing to the disturbing effect of high temperature upon the lochia, it is well also to administer one or more vaginal injections of some antiseptic solution, and when the fever subsides, which it usually does as rapidly as it came, a five grain dose of quinine will be of benefit. In the great majority of cases the secretion of milk is gradually increased, the breasts affording an ample supply in from thirty-six to seventy-two hours. It is very seldom that the breasts do not contain from the beginning enough milk for the sustenance of the child. The practice of feeding the child during the first day or so should be discountenanced, both in the interests of the mother and child, in which case there will be still less excuse for the castor oil, butter

and sugar, catnip tea, and other brews supposed to be necessary for the child. Early and regular nursing contributes greatly to the easy performance of the new function. Should the milk be secreted too rapidly, it must be artificially withdrawn.

The Dangers.—"As well as could be expected, under the circumstances," is the conventional answer given in response to any inquiry as to the health of the lying-in woman, even when she is apparently in as good health as ever. It expresses much truth, as the common sayings of mankind are apt to. The woman after a normal labor is doing well; would be up and about if allowed; is undergoing a physiological change; but it is dangerously near to a pathological one; she is skating on thin ice. The subfebrile condition, the increased vascular tension, the free perspiration, the rapid excretion of disintegrated tissue in the lochia, create a predisposition to disease, even in the most normal case. When we add to this the bruising and lacerations to be found to some extent in the majority of cases, we have at least good warrant for careful watchfulness and the use of some precautionary measures. The woman is more susceptible to changes of temperature, inflammations are easily excited, and septicæmia may be developed in several ways.

Hygiene.—To guard against these dangers, two things are of prime importance, *cleanliness* and rest. Antisepsis has been carried by some to a degree bordering upon the ridiculous. Some demand that the child shall emerge from the vulva in a halo of carbolized spray. Others endeavor to seal up the

vulva with an antiseptic pad. Others recommend routine vaginal injections of antiseptic solutions several times each day, and in every case. Some go so far as to use these injections every few hours through the entire labor as well. Injections will be demanded to combat existing disease, and are then of great value, but their indiscriminate employment causes a needless disturbance of the parts, and tends to bring their rightful use into discredit. What we want to secure is cleanliness. As the lochial flow is discharged upon the napkin placed to receive it, a certain amount will collect and dry upon the vulva if this is not frequently washed. An excellent method will be found in the copious use of hot water. The nurse should be directed to place a bed-pan under the woman three or four times a day, and then with a fountain syringe douche the external parts well with a quart or more of hot water, after which they may be dried by a light touch with a soft cloth, and the napkin may be reapplied. This not only cleanses them as no sponging will do, but the hot water also acts as an astringent, and helps to restore the tone and close the gaping vulva. It is also very grateful to the patient. Injections in the vagina or uterus should not be made unless really necessary, as the tissues need rest, and should not be handled. In ordinary practice antiseptics need not be used as a prophylactic, but in a hospital or during the prevalence of an epidemic it may be wise to take extra precautions by having the napkins prepared with a solution of corrosive sublimate or other antiseptic.

Rest in bed is scarcely less essential. Travellers'

tales inform us of the ease with which savage women drop their children and continue their avocations, sometimes putting the husband to bed as the one in need of rest. They do not, as a rule, continue the story to the end and tell us of the uterine diseases and general female mortality which follow such customs. The womb after labor is large and heavy and its supports are relaxed and weak. If the woman arises and goes about, the womb will sag in the pelvis and drag upon its bloodvessels. There will result a venous stasis, as a result of which subinvolution or inflammatory changes are almost inevitable. The womb is also soft and more easily bent at this time. Flexions are often caused by the woman bending forward as she sits up while nursing the child. This she should be specially cautioned against. She should lie down when nursing for the first two weeks, and always avoid the bent-forward position. If the baby is heavy and the woman weak, she ought not to lift it any more than can be avoided.

The bed is the place for the civilized woman during the first ten days, or until the womb has retreated within the pelvis. Unless she is very weak, there is no reason why she should rigidly maintain any particular posture, and even if weak, she should be shifted occasionally to one side or the other, to prevent hypostatic congestions. It is of service to have her well propped up in bed once or twice a day with pillows under the shoulders, in order to promote drainage, and, as already mentioned, she should sit up in the bed when using the chamber. She should not get out of bed for any

purpose. There is always a cold stratum of air next the floor, and with her freely acting skin it is best not to take the risk. By the tenth day she may be allowed to sit up for a few hours and may then gradually resume her usual manner of life. If it is at all possible, no work should be done during the first month, especially such as involve lifting.

Diet.—Good nourishing food and plenty of it is needed if the woman is to keep up her own strength and provide sustenance for the child. When a labor has been exhausting, the diet should be of light, easily digested, and mainly fluid food for the first few days. This will aid the stomach which, like the rest of the body, is weak. Oatmeal gruel, milk, and the like nourishment may be given freely, and as soon as she can take a full and miscellaneous diet it may be given. Water in plenty may be given, but whiskey, wine, beer, and porter are medicines to be given when needed and not articles of diet to be given for strengthening purposes. Our climate and hurrying mode of life make enough drunkards without beginning the process in the infant's milk. A glass of hot milk or other extra nourishment will give more real and enduring strength.

Ventilation.—The lying-in room should be well lighted and ventilated. On returning to visit a case one often finds the room sealed up and in Egyptian darkness. The excuse is that the light will hurt the baby's eyes. It is perhaps well to have the child's eyes shaded from a direct light, but neither the mother nor child will do well in a dark room. Visitors should be excluded as much as possible,

and the patient allowed to rest in every sense of the word.

The physician should make daily visits or oftener for the first week. After the third day there is little probability of trouble if all has gone on well up to that time. Occasional visits should be made until the puerperal month is past and the patient should not be dismissed then unless she is in good health. The period of involution is a very favorable time to cure uterine enlargements and displacements, and if the labor has created any damage it should be repaired before it has had time to do harm.

CHAPTER XIX.

SEPTICÆMIA.

The most important of all the diseases incident to the period of involution is septicæmia. It is difficult at present to make an accurate definition of this disease because of the differences in opinion concerning its true causation. It is a febrile condition of which the clinical appearances can be easily recognized, and, as is often the case, the treatment also is far in advance of theory. It is met with in the puerperal state in three forms: 1, acute septicæmia; 2, subacute or chronic septicæmia; and, 3, septicæmia complicating or complicated by inflammations, such as peritonitis, cellulitis, etc.

1. *Acute septicæmia* occurring by itself is a not very common disease. It is characterized by a sudden rise of temperature not preceded by a rigor and unaccompanied by localized pain. The patient may experience a vague creepiness, but no chill occurs unless an inflammation is coincident. The fever rises at once and rapidly to 104°–106° F., the pulse corresponding with a rate of 120–140 beats per minute, this being attained sometimes within an hour or so after the beginning. The cheeks are flushed, the alæ nasi dilating, the expression anxious. In curious contrast are the subjective sensations of the patient. She is seldom alarmed at her condition,

is often apathetic and will usually state, if asked, that she feels pretty well. Shooting pains in the limbs and shoulders are sometimes complained of, and headache. The lochia are either suppressed, or, if present, are diminished and offensive. Tenderness on pressure in the hypogastrium may possibly be elicited, but pain is seldom present and still less often complained of. Occurring alone there is no disease with which this can be confounded except its congener, pyæmia and a sharp rigor is apt to usher in that condition, which also occurs later in the stage of involution, as a rule.

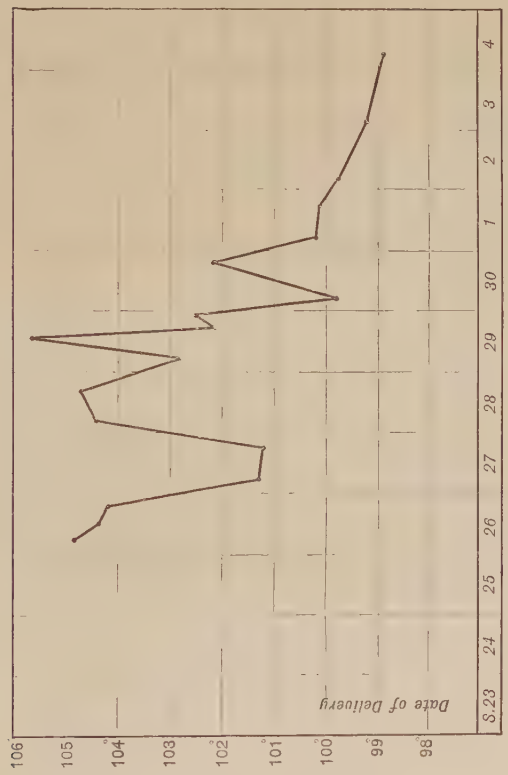
In most fatal cases the foregoing symptoms increase. The temperature rises to 106°–109° F., the apathy increases and deepens into coma, the heart rapidly fails, and death may occur even at the end of the first day. In less violent cases the temperature subsides and becomes rather irregularly remittent or intermittent. If the poisoning is renewed, the disease may continue for days, rarely for weeks, the patient dying from exhaustion. Inflammation either of the pelvic tissues or elsewhere is to be expected if it continues for more than a few days. When the source of poisoning can be removed, recovery is commonly prompt, or if there is still a slight persistence of the cause, it may recur at intervals or continue in the subacute form for weeks, the patient recovering slowly. The irregularity of its course is well shown by the following case (Temperature chart, Fig. 28): Mrs. S., æt. 24, primipara, September 23d delivered after ten hours of easy labor. The afterbirth was expressed and upon examination it was found that a strip of membrane an inch wide and reaching from

the placental edge to the tear, was left in the womb. This strip was not to be felt at the os by the examining finger, and it was wrongly deemed best to allow it to remain rather than to introduce the hand in pursuit. She felt very well until the morning of September 26th, when fever began, and by 7.30 A. M. the pulse was 150 and irregular, the temperature over 105° F., the respiration rapid, the face scarlet, and she complained of some headache. The Temperature Chart (Fig. 28) begins an hour later, and when she was evidently cooler. The strip of membrane was found loose at the os uteri and immediately removed; and the uterus washed out with iodinized water, after which she expressed great relief, the headache being at once removed. The subsequent treatment consisted of intrauterine and vaginal injections, quinine, salicylate of soda, and Rochelle salts, sufficient to prevent constipation. The rise on the 29th was preceded by a chill and was evidently of malarial origin, principally. She had suffered from malaria during the pregnancy and had been compelled to change her residence on that account. No pain or tenderness was felt in the abdomen at any time, and the recovery was prompt.

Acute septicæmia is rarely developed until the third day and seldom after the tenth day after delivery. It is met with more frequently after abortions and in labors where fragments of placenta or membrane have been retained, or, in other words, when putrescible material exists in the womb. The lochial fluid itself is highly putrescible when long retained. A slight inflammation or œdematous condition of the cervix from bruising during labor may

prevent its exit. I have seen a sharp attack of septicæmia caused by the lochial discharge being dammed back in the womb by reason of an impacted rectum, although the retention had not exceeded forty-eight

Fig. 28.



hours. The lochia also may develop poisonous properties when the temperature of the patient is raised from any cause, such as malaria. It is, there-

fore, a fair inference that acute septicæmia is caused by the absorption of an animal poison evolved from decomposing tissue or the lochia. Whether this evolution is due to micrococci or to chemical or electrical changes, is a secondary matter, except as it influences preventive treatment. If the entrance of micrococci cause the changes, it is logically proper to seal up the vulva hermetically with antiseptic dressings and change them only under the spray. If not, we may continue to rely upon common cleanliness, as in ages past. From a purely clinical standpoint, we should be very much afraid of matters which ought to come out of the body and but little afraid of anything getting in. If we can secure a cleanly emptied, well-contracted uterus, and a free passage for the lochial discharge, we may defy the micrococci to enter.

2. *Subacute septicæmia* differs from the acute form mainly in degree. It is a common condition, especially when lacerations of the cervix or perineum exist, and when the womb contracts poorly after delivery. Fever is present, and of a remittent or intermittent type. In mild grades it is necessary to appeal to the thermometer in order to detect fever. The tongue is pale and indented, with a light fur, if any. The breath has a more or less faint sweetish odor. The complexion is pale and anæmic, and the patient is apt to have night sweats. Neuralgic pains are occasionally complained of, and indefinite malaise, accompanied by muscular weakness, so that the patient finds it more comfortable to remain in bed when the usual time has come for arising. The lochia are usually scanty, and of pronounced

odor, though scarcely offensive in the ordinary sense of the word. They may be free and of a dark hue, or tinged with red. The urine is dark colored, and constipation exists. The general *facies* resembles chronic malarial poisoning or dumb ague. The patient is evidently suffering from the retention of excrementitious matters in the blood. It is in mild cases akin to that condition which is called "biliousness." There is a want of activity in the excretory organs, so that the system does not rid itself of matters which should be expelled, as in cases where the liver, kidneys, or other emunctories are temporarily crippled, and the detritus of tissue change is retained in the blood. There is a family resemblance in all such self-poisoned conditions. It is probable that in some cases there is a suspension of excretion at the very beginning, the débris of uterine involution being at once absorbed, instead of being excreted, or the failure of the excretory organs to deal with the material absorbed. Subacute septicæmia develops gradually, being often overlooked until the time comes for the patient to leave the bed. It may continue for weeks or months, and is the most common cause of delayed convalescence after delivery. Involution is retarded and incomplete. The cellular tissues everywhere may be affected by the poisoned blood. Inflammations are apt to occur, especially in the breasts. Boils and abscesses are not infrequently met with. Pelvic cellulitis may figure both as cause and effect. Parvin[1] records a case in which the septicæmia was overlooked until the fourteenth day, when pleuritis and peritonitis were developed.

[1] Journ. Am. Med. Assoc., Oct. 18, 1884.

The recuperative powers of Nature may be equal to the final removal of this condition, but proper treatment may cut it short at any time.

3. Septicæmia, especially in the acute form, may be met with in conjunction with other diseases, the mixture being sometimes evident, and in other cases made obscure by their mutual reaction. A cellulitis or peritonitis rarely occurs in a pure form during involution. There will commonly be at least a substratum of septicæmia, modifying the symptoms ordinarily met with. To this fact it is principally due that all the diseases incident to this period have been at one time or another confounded together under the heading of puerperal fever. The common bond of union, the underlying septicæmia, has made this possible, and great confusion has resulted. So persistently has this idea of a single childbed fever been clung to, that a theory of special zymosis has been invented; a fever caused by the introduction of a poison from without which can attack neither man, woman, nor child, except in the one instance of a recently delivered woman. The peculiarities caused by the commingling of septicæmia with other diseases are in most instances easily recognized, and no special mention need be made of any, except peritonitis.

Peritonitis may run its course in substantially the same manner as in the non-puerperal individual. It is somewhat less painful, and the typhoid state is earlier developed in fatal cases, the mortality being much greater than at other times. There is a great difference in different epidemics, as well as when it occurs sporadically. Gordon, in Aberdeen, found

that every patient recovered from whom at least twenty ounces of blood were abstracted, but not otherwise. This must have been an epidemic differing from any ever witnessed in this country, and was probably one of uncomplicated peritonitis. The disease is more often met with when erysipelas, diphtheria, and scarlatina are epidemically prevalent, but it may occur independently. It may precede or be preceded by septicæmia.

A strange form is sometimes noticed, which occurs also after abdominal sections, and which may be taken to be the typical form of mingled peritonitis and septicæmia. In this the temperature scarcely rises above the normal, and may be even subnormal. The pulse is frequent and thready, the countenance anxious, the features pinched, the alæ nasi dilating. The abdomen is tympanitic, and deep pressure may elicit pain, but more commonly the patient is entirely anæsthetic and apathetic, and may state that she feels well even within an hour before death. The skin is often clammy, the other secretions being almost entirely suppressed. Death occurs quietly in from thirty-six to seventy-two hours. A post-mortem section will reveal slight peritonitis, rarely more, making the symptoms noted very remarkable. Although both septicæmia and peritonitis have high temperatures, their union appears so to overwhelm the patient that there is a depression from the beginning. Recovery must be very rare, indeed, from this condition.

Endometritis may occur with septicæmia, though in most instances the correct diagnosis would be uterine thrombosis and phlebitis. It may occur in

women who have had gonorrhœal vaginitis during pregnancy, and is associated with ophthalmia neonatorum.

Lymphangitis (periuterine) is a common accompaniment of septicæmia, and is not usually discriminated from cellulitis, the sepsis creating a much higher fever than would otherwise be excited. The usual effect of septicæmia in conjunction with other diseases is to lower the type.

There is more weakness from the start, and the typhoid state is more apt to be developed. If the disease is usually characterized by pain, there will be a marked diminution of that symptom. The anæsthetic effect of septicæmia is misleading, unless well understood and acted upon. No reliance is to be placed upon statements of the lying-in woman as to her condition. The physician must investigate for himself and see that everything is proceeding in a satisfactory manner. A tympanitic condition of the abdomen is always suspicious after labor; it may be a sign of peritoneal irritation, and should always put one on guard against peritonitis and all other pelvic inflammations.

Contagion.—A question once fiercely debated was, whether puerperal fever is contagious. If there is no distinct puerperal fever, the question must be recast before its discussion can be profitable. We should first inquire whether septicæmia can be excited by the introduction of any septic matter from without, by the hand of the physician or other attendants, or by a miasmatic or other more vague form of contagion. It has already been stated that septicæmia may arise from within, from changes in

the lochia and other putrescible matters. If a fragment of placenta or membrane remains in the womb, we may expect to have septic absorption; if a woman is cleanly delivered, we do not. This is a plain clinical fact, upon which we all act. The real practical question is, whether external agencies may bring about the septic change when it would not otherwise originate. Can we carry any material poison, whether plain dirt or germs, which will convert an otherwise natural case into one of disease?

Whatever theory we hold as to the *modus operandi*, it is commonly agreed that a physician in attendance upon certain diseases should not attend cases of labor, or at least not without adopting special measures of antisepsis. Erysipelas, diphtheria, and scarlatina appear to have the power of determining the occurrence of septicæmia. Whenever these diseases prevail epidemically, the surgeon finds that wounds do badly and operations are more dangerous. The obstetrician finds that his patients convalesce slowly, and are more subject to septic and inflammatory disorders. In neither case do we necessarily find either an erysipelatous blush or a diphtheritic patch. There may be no visible evidence of contagion; but, instead of this, septicæmia in mild or severe form occurs. This is shown in a striking way by the result following post-mortem sections at times. Dr. R. P. Harris[1] records the following fact: "Three physicians of this city once examined a case of erysipelas after death, and were all called in the following night to cases of labor; the three women all

[1] Amer. Journ. Med. Sci., 1876.

took childbed fever and died." From the context it is probable that by childbed fever the author means peritonitis with septicæmia. At all events, he does not mean erysipelas. Nearly all accounts of contagion are vitiated by the use of this term, childbed or puerperal fever; but in most modern instances it may be taken to mean septicæmia, with or without inflammatory complications. Many cases are on record to show that this condition may be evoked by contact with other diseases. Dr. Labatt[1] stated that typhoid fever cases were capable of originating the disease in a hospital ward. It is worthy of inquiry whether any infective febrile disease cannot originate septicæmia by raising the patient's temperature and thus creating septic changes in the lochia. The septicæmia thus developed may then proceed, whilst the disease which provoked it is aborted or substituted by it. A physician should on no account attend a woman in labor for at least a day after making a post-mortem section. The cadaveric fluids are absorbed by the epithelium of the hands, and no one or two washings can thoroughly cleanse them. The nose informs us of the presence of foreign matter in the skin after ever so elaborate a cleansing. The law of Moses concerning the touching of dead bodies was based upon sound hygienic principles. Similar precautions should be taken after contact with suppurating wounds, uterine cancer, and the like sources of poison. Where attendance upon a case of labor is unavoidable after contact with any of these condi-

[1] Churchill, Midwif., p. 543.

tions, the physician should take a bath, change his clothes, and wash the hands in a solution of corrosive sublimate or cyanide of potassium, besides bestowing extra care upon the toilet of the finger-nails. It is strange, but true, that some men seem to have a comparative immunity from carrying contagion, while others are in league with pestilence. The case of Dr. Rutter has been made notorious through the writings of Meigs. No precautions seemed to prevent him from bearing disease and death to the lying-in room. I have seen somewhat similar instances. The conclusion of the whole matter is, that we should be very clean when we attend a parturient woman.

Treatment.—A patient with acute septicæmia is in a condition strikingly analogous to that of one bitten by a snake. A poison is introduced into the blood which causes minute changes in the tissues and also produces a sharp shock to the nervous system. The patient may be overwhelmed by the primary depression. If this can be averted in case of snake-bite, the patient recovers unless the diffuse changes in the tissues have involved vital organs too deeply. In the case of septicæmia we must also stop the further absorption of poison, and if we can succeed promptly in doing this, we need not fear the slight damage caused by the poison already absorbed. The indications for treatment in acute septicæmia are, therefore, threefold. We must neutralize the primary effect of the poison by free stimulation; we must put a stop to the generation of the poison, and we must increase the activity of the excretory organs of

the body with a view to eliminate poison already absorbed, and to hinder further absorption.

Tyler Smith has injected liquor ammoniæ into a vein of the forearm, using a half drachm diluted with water in the proportion of one to three. In one case he states that he had never seen so sick a patient recover. This is the method recommended by Halford for snake-bite. It has been probably little if at all used in this country, whiskey internally answering every purpose. Whiskey in half-ounce or ounce doses, repeated every hour if necessary, protects the system from the shock of the poison and diminishes the temperature. The first attention of the physician should be directed to cleansing the womb; removing any clots or undelivered fragments of tissue, and making the cavity antiseptically clean. To this end an intrauterine injection should be administered. A fountain syringe is the best instrument for the purpose, though the ordinary rubber-ball syringe will do if the former cannot be obtained. A large flexible catheter without its stylet may be fastened to the nozzle of the syringe by an inch or two of rubber tubing, and then introduced into the womb. Special tubes and apparatus are made for this purpose, but none is more satisfactory in action than this readily extemporized instrument. A finger should be kept at the os uteri to keep it patulous and to see that there is as ready an exit for the fluid as an entrance. When injections are greatly needed, the cervix will usually be found quite open. The water for the injection should be warm or hot, as preferred, and prepared with some antiseptic. The solution most

commonly used of late is of corrosive sublimate, 1 part in 1000 or 2000. Tincture of iodine, in the proportion of an ounce to the pint or stronger, is very satisfactory, but comparatively expensive. Carbolic acid is often used in a two or five per cent. solution. It is ill-suited for continuous use, being sometimes absorbed in sufficient quantities to produce unpleasant symptoms. The best plan is to wash out the uterus well with warm or hot water, using it freely and until the returning fluid is clear and without flakes or shreds. The antiseptic may then be added, when a small quantity will suffice. The danger of intrauterine injections is slight and in marked contrast with the risks attending the same proceeding in the non-puerperal womb. If there is free exit for the fluid and ordinary care is used in injecting it without force, it is scarcely possible to do harm, and we have few resources which are attended with such brilliant results. The patient is at once made comfortable, the temperature falls, and, what is more important, the axe is laid at the root of the disease. The necessity for the repetition of the injection will depend upon the nature of the case and the effect produced. When decomposing fragments of tissue are left in the womb, the injection should be repeated at least every six hours until the danger is past. When the poisoning is due to the temporary retention of the lochia and similar conditions, one or two injections may suffice, though vaginal injections should be used several times a day. Even cleanliness may be overdone. In washing the hands we do not aim to remove the epider-

mis and leave the corium bare, neither should the vagina be too frequently harassed by syringing.

Having protected the nervous system by stimulants and prevented further absorption by the injections, we should next endeavor to aid the excretory organs in expelling the poison and to repair the damage already done to the blood. The researches of Schiff and Lautenbach make it probable that animal poisons of excrementitious nature are destroyed in the liver. We have, therefore, good reasons for promoting the functional activity of that organ. Calomel and ipecac rightly used will be effective agents whatever their mode of operation. In Collins's treatise is recorded a case (among others) of what appears to have been septicæmia with some inflammatory complication or uterine thrombosis, in which, during three days, the patient took twenty-five powders containing four grains each of calomel and ipecac. In eight days thereafter she was dismissed well. He also states that upwards of 500 grains of this powder were sometimes administered in the course of the disease. Such free administration is, to say the least, unnecessary, but the records of Collins clearly show that this treatment was in the right direction. There is not a great deal of margin for hurtful treatment in these cases. Remedies which do harm cannot certainly be given to excess without a fatal effect. It is better to begin with a decided dose (5–10 grains) of calomel and in a few hours after to give a saline, preferably Rochelle salts. Ipecac may then be given alone or in combination with other medicines. Dover's powder is of service if there is pain. Salicylate of

soda appears to do good in ten or fifteen grain doses every two or three hours. When any suspicion of a malarial complication exists, quinine dissolved in aromatic sulphuric acid, should be given freely. Should constipation continue, the calomel should be repeated. It is sometimes well to give it in one-grain doses combined with a half grain of ipecac every three hours for four to six doses and then administer a few drachms of Rochelle salts, if necessary. When the temperature remains high in spite of intrauterine injections, a wet pack is highly recommended by Thomas. The fever is so high that its reduction becomes an urgent matter, and the pack should be used if other means fail.

The treatment of chronic septicæmia should be based upon the same principles. Stimulation will be needed but little, the main indication being to assist the liver, kidneys, and skin in the work of elimination, and to remove the cause if possible. Intrauterine injections will usually be more difficult to administer. By the time the disease is recognized, the os may not be sufficiently patulous for their safe use. Instead we may give vaginal injections of hot water several times a day. These will promote the contraction and condensation of the womb, and thus indirectly combat the septic process. These would be needed at any rate for the cure of the subinvolution always present. There will be minor details in every case to be attended to, but the general principles of treatment will not vary. When inflammations coexist with septicæmia, the treatment may be more difficult. With either peritonitis or cellulitis the use of injections of any kind

becomes a doubtful or altogether impracticable undertaking. In a typical case of conjoined septicæmia and peritonitis, where the patient placidly and painlessly sinks under the shock, and only the post-mortem section shows that peritonitis existed, the otherwise successful opium treatment of the latter disease seems to be clearly out of place, and active eliminant treatment seems equally barred. It is not wise to dogmatize upon the treatment of these cases with our present information. In general, it may be said that either the septicæmia or the inflammation precedes. If the inflammation is secondary to the septicæmia, the latter should be treated with little reference to the former. If an inflammation excites septic changes in the lochia, it will be well to consider principally the inflammation. I have notes of several cases of puerperal parametritis successfully treated by the free use of veratrum viride and opium, without any attempt at even vaginal injections, although a septic substratum clearly existed with a temperature of 104°–105° F. The free use of opium is proper in any inflammatory disease attended with great pain and especially in peritonitis. If there is no pain, it does harm in an equal proportion.

CHAPTER XX.

THROMBOSIS: MILK-LEG: SUDDEN DEATH: PELVIC MOBILITY: HEMORRHOIDS.

In a womb which is well contracted after delivery the sinuses enlarged by pregnancy are closed by the condensing tissue in which they are embedded, and are soon obliterated. If the uterus remains poorly contracted and flabby, the sinuses are not completely closed, a certain amount of circulation is for a while maintained, and hemorrhage, either free or a slight oozing, takes place from the apertures in the placental site. Worse than this, because usually overlooked, thrombosis may occur in the sinuses, the clots extending sometimes beyond the limits of the uterus. A uterine thrombus may do no harm, and in due time be absorbed, or otherwise innocuously disposed of. More frequently it undergoes putrefactive changes, excites phlebitis and pyæmia, and predisposes to the occurrence of all the inflammatory disorders and septicæmia. Thrombosis, associated with phlebitis, has frequently been mistaken for metritis. Pain and tenderness exist in the hypogastrium, the patient has fever preceded by a chill. The lochia usually continue dark in color, and are often offensive, with small clots. The further course will depend on the amount and character of the inflammation excited. Should death occur, the uterus will be found to be flabby, large, of redder hue than

is ordinary, and perhaps the knife will cut into a collection of purulent matter. But if this latter be examined with care, it will be found to be in the course of a uterine sinus, and not an abscess in the proper uterine tissue. It is doubtful whether the muscular tissue of the uterus is subject to inflammation of a suppurative character, though endometritis may of course occur at this time. The pain attending uterine phlebitis may be quite sharp, and suggestive of peritonitis, which may also be present as a sequel, but not necessarily. It may be discriminated from cellulitis or lymphangitis by the absence of enlargements or exudations about the womb. The fever is remittent in type, becoming continuous in fatal cases. In a large proportion of cases recovery occurs gradually by reason of the subsidence of the inflammation and absorption of its products. It may also be followed by phlegmasia alba dolens, the thrombosis or phlebitis extending into the veins of the leg. Pyæmia may be brought about suddenly when the thrombus is attended with suppuration. The woman may sit up in the bed or change her position in such a way as to make pressure upon the womb, when the end of the clot may be disturbed, and a considerable amount of pus enters the circulation at once. This causes a marked chill, followed by a high rise of fever. It the amount is large, the woman may succumb rapidly, death having occurred within a few hours of such an accident. When pus escapes gradually, or is simply absorbed, the symptoms are nearly those of chronic septicæmia, plus the uterine pain and tenderness. The clinical distinction between septicæmia and

pyæmia is, therefore, not always clear, especially when we are called upon late to make the diagnosis, although the etiology is different, and treatment has not the same effect. They may also coexist.

Fragments of the clot may at any time be broken off and carried by the circulation to any organ or part of the body. Sudden death from apoplexy or pulmonary embolism may thus be brought about. Metastatic abscesses are caused in this manner, as also pneumonia, pleuritis, mastitis, and other inflammations. Barker, in the *Puerperal Diseases*, begins his account of "puerperal fever" with the record of four fatal cases, in all of which thrombi, or purulent matter, were found in the uterine sinuses, peritonitis being also present.

Prevention is in this case much better than cure. The method of Credè in delivering the placenta, secures such firm uterine contractions that uterine thrombosis is extremely infrequent after its use. When the womb is not well contracted after labor, the physician should watch the patient with unusual care through the whole period of involution. Hot water vaginal injections should be used at least once a day from the very beginning. At the first appearance of pain or tenderness in the hypogastrium, the lower half of the abdomen should be painted with the tincture of iodine, after which hot cloths or spongiopiline may be applied. Absolute rest should be maintained. Otherwise the treatment useful in septicæmia may also be employed here. A sudden increase in fever should be met with free stimulation. Intrauterine injections should be cautiously administered if the lochia are dark colored,

offensive, or scanty, but the condition is compatible with an unaltered discharge. One should also be prepared to combat hemorrhage, if an intrauterine injection is given, since it may dislodge a clot which has been sealing a sinus communicating with the circulatory current. As a rule, vaginal injections will be sufficient. Inasmuch as we cannot remove the cause, a supporting treatment will be required from the beginning, to enable the patient to endure the often protracted drain on her strength. Nourishment will not be well assimilated unless at the same time the excretory and secretory apparatus are kept in good working order. Ipecac, with occasional doses of calomel and saline laxatives, will be of substantial service in this respect. Anodynes may also be needed.

Milk-leg, or *phlegmasia alba dolens*, is an inflammation of the cellular tissue surrounding the course of the femoral or saphenous vein. It is usually associated with phlebitis of the same veins, and thrombosis is both precedent and consequent, if not cause and effect. A clot beginning in a uterine sinus may extend until the vein of the leg is in like manner occluded. Thrombosis is not a necessary accompaniment, but this is its most common source. In puerperal cases it rarely begins anywhere but from above; in other cases, it may begin with a phlebitis in the foot or ankle. It is almost invariably limited to one extremity. The disease occurs late, rarely before the second week after delivery. There is usually a prodromic stage of malaise with irregular chilliness and the general aspect of subacute septicæmia, especially when it proceeds by extension of

a uterine thrombosis to the leg veins. This is followed by a distinct rigor and elevation of temperature, and pain is noticed in the leg, especially when it is moved. If septicæmia coexist, the pain may not be complained of, and it is quite possible, under such circumstances, to overlook the local trouble at first. The leg rapidly becomes swollen, white, and shining; the œdema being general if the vein is closed by a clot. In phlebitis of the saphenous vein its course is marked by a superficial red line. Afterwards, or when there is thrombosis, the vein may be felt as a cord under the skin. The amount of fever and constitutional disturbance depends upon the height of the inflammation, which is very variable, in some cases being very mild. Pain may be excruciating in character. In other cases there is little pain if the leg is kept quiet and elevated. Pyæmia may occur, as in uterine thrombosis, and embolism may also result. The duration of the disease is irregular, depending upon its intensity, freedom from complications, and, to some extent, the treatment employed. In a large proportion of cases complete resolution takes place after an active course of a week, more or less, the swelling subsiding gradually. An abscess may form anywhere in the course of the inflammation, and the trouble at once subsides after its evacuation. In a few cases gangrene of the leg occurs, with pyæmic poisoning and death. As a remote consequence it may be noted that the affected vein seldom becomes pervious again, and there is a permanent injury inflicted.

For years after, the patient will be subjected to a painful swelling of the foot and leg after walking or

standing much upon it. Leg ulcers may also result from slight bruises, because of the defective circulation.

Treatment.—Rest is of first importance. The leg may be swathed in cotton batting or in cloths wet with the time-honored mixture of lead-water and laudanum, or a decoction of hops in dilute vinegar applied hot. A thorough painting with tincture of iodine over the course of the vein, in a track one or two inches wide, appears to be of some service both when performed early and in the stage of resolution. Belladonna ointment relieves little if any, but a solution of atropia applied on a cloth may be of some use in limiting the inflammation. Morphia or Dover's powder may be given freely for the relief of pain. During the high inflammatory fever the patient will be made more comfortable by the use of aconite or veratrum viride. Constipation must be carefully avoided. When resolution has begun it may be greatly promoted by the acetate of iron, or by a mixture of dilute acetic acid and the tincture of the chloride of iron, combined with glycerin and sherry wine. Rochelle salts in moderate doses daily are useful as keeping the bowels and kidneys in action. When the patient has recovered and is able to sit up, an elastic stocking or bandage should be applied to the leg and worn for some time as a precautionary measure.

SUDDEN DEATH during the period of involution may occur from some causes not operative at other times, as well as from such general causes as heart disease, syncope, and the like.

Air in the Veins—It is not very uncommon for air to enter the vagina and womb just after delivery. In three successive labors of the same woman I have noticed that, as the child was expelled a reflux of air entered the vagina and womb with some noise, in spite of firm suprapubic pressure exerted during the entire expulsion. This may do no harm, but under some circumstances the air may gain access to the uterine sinuses and thence into the general circulation with speedy death as a result. This is explained by Simpson as being forced in by a uterine contraction following a relaxed condition with the coincident plugging of the uterine orifice by a clot. He records the following case.[1] The woman had considerable post-partum hemorrhage following the birth of twins: "Alternate contractions and relaxations of the uterus supervened, and she seemed to rally very imperfectly from the effects of the flooding. In consequence of this Dr. S. saw her an hour or so subsequently. The pulse at that time was very rapid and weak, almost imperceptible. The countenance extremely anxious, and here and there was an evanescent red scarlatinoid rash over the body. The patient died in a few hours. The body was opened a short time after death, because it was considered desirable not to incur the fallacy of air being present from decomposition. . . . . The abdomen was opened under water. The lower vena cava, but especially the uterine and hypogastric veins were distended with frothy blood and air bubbled up through the water when any of

[1] Works, Obstetr., p. 503.

these tubes were opened. The larger veins in the extremities were in the same state." The rash, which is also described as vermilion-red in color, is said to be characteristic of this accident. There is danger of injecting air into the uterus when using a rubber ball syringe or other instrument with valves, which is one reason for preferring the fountain syringe for this purpose. Firm contraction of the uterus from the beginning is probably a sure safeguard. For the accomplished fact no treatment suggests itself.

Pulmonary embolism is the most frequent cause of sudden death during the period of involution, being due, as a rule, to uterine thrombosis, and from the same cause cerebral embolism may prove suddenly fatal.

Mobility of Pelvic Joints.—Extreme relaxation of the pelvic symphyses, more especially of the pubic joint, is sometimes permanent after delivery, causing entire inability to walk. When the mobility is more moderate, the gait may be uncertain and staggering only. It may be readily detected by manipulation of the bones, holding the pubes between a finger in the vagina and a thumb on the mons veneris, while the woman attempts to rise or move. It may further be suspected from the absence of all other conditions likely to interfere with walking, and the effect of treatment will be further corroborative. A tight bandage around the pelvis will afford relief and permit the patient to walk. The mobility gradually disappears, but in some cases has persisted for years. Inflammation of the pelvic joints is very rare.

Hemorrhoids are very common in pregnant women and liable to protrude after the expulsion of the child. The physician should be on the lookout for this and replace them immediately after the delivery, else he will probably be sent for in a few hours to find his patient in great torment. A douche of hot water and a hot cloth will assist in their retention. The period of involution is a favorable time to secure their removal by medication.

The same treatment will not be required in all cases, but the pill of Dr. Barker comes very near to a universal remedy for hemorrhoids. It is as follows:

℞.—Extract. colocynth. comp. . . . gr. $1\frac{2}{3}$.
Extract. hyoscyami . . . . gr. $1\frac{1}{4}$.
Extract. nucis vomicæ . . . gr. $\frac{1}{2}$.
Pulverized aloes socot. . . . gr. $\frac{5}{12}$.
Pulverized ipecac . . . . gr. $\frac{1}{12}$.
Podophyllin . . . . . gr. $\frac{1}{12}$.
M.—Ft. pilula.

One of these at bedtime, repeated in the morning if necessary, will keep the bowels regular and if continued will promote the cure. In some cases it is sufficient to maintain softness of the passages with the compound licorice powder containing sulphur and senna.

CHAPTER XXI.

MASTITIS.

It has already been noted that when the function of lactation is established suddenly, the breasts become hard and painful, and an irritative fever is caused. This is due to the engorgement of the bloodvessels in the breasts. With appropriate treatment this will subside as promptly as it arose. A similar engorgement may occur at any time during lactation from a variety of causes. The irritation of sore nipples, cold, failure of the child to evacuate the breast, and other causes, may bring about a mammary hyperæmia, which, if unrelieved, may deepen into inflammation. When the breasts are not thoroughly emptied, either from obstruction of a milk-duct, or from a too free secretion, the retained milk may undergo changes similar to those occurring in milk outside of the body. The cream will separate, lactic acid may be developed, and thus the milk becomes an irritant, causing inflammation in the ducts, which spreads to the surrounding tissue. Septicæmia predisposes to this, as to all inflammatory affections. Emboli from a uterine thrombus may also originate inflammation, and external violence, even from the striking of the child's hand, may be a cause. Of all causes, inflammation of the nipples, with or without obstruction of the milk-ducts, is the most common.

Three forms may be distinguished: 1. Interlobular or subcutaneous mastitis; 2. Glandular, lobular, or parenchymatous mastitis; 3. Subglandular mastitis.

1. *Interlobular mastitis* consists in an inflammation of the subcutaneous connective tissue, and of that extending between the lobules. It does not materially differ from areolar inflammation elsewhere, almost invariably terminating in an abscess. It begins with a chill, followed by moderate fever, attended with pain in the affected breast. This pain is not increased by the child suckling, unless the nipples also are sore. The breast exhibits a circumscribed swelling, hard at first and moderately tender, which becomes soft as fluctuation is developed by the presence of pus. It may run its course in three or four days, and is seldom longer than a week in duration. When the pus is evacuated it usually heals at once.

2. *Parenchymatous Mastitis.*—Much more formidable is the inflammation which attacks the proper substance of the gland. The nature of the cause will influence the course and duration of this disease. It commonly begins with the development of one or more hard nodular masses in the breast. These become increasingly painful, especially when an attempt is made to have the child nurse. After the inflammation is fairly established, the pain may fairly be characterized as agonizing. The overlying skin becomes red, and the whole breast is exquisitely tender. This may continue for some days before a marked chill or mere chilliness announces that suppuration has begun, after which the inflammation

proceeds with more rapidity. But since the inflammation is deeper seated and in denser tissue than in the subcutaneous form, it usually requires a longer time for the pus to make its way to the surface and be discharged. Neither does the inflammatory process terminate so promptly. Shreds of tissue slough and come away, protracting the period of healing, and sinuous tracts may be formed which may keep up the discharge for months. On the other hand, resolution sometimes takes place after several days of threatening, either spontaneously or with slight treatment. In embolic inflammation a portion of the gland may become gangrenous, but this is of rare occurrence.

3. *Subglandular mastitis* consists in an inflammation of the areolar tissue underneath the gland. An abscess is always formed upon which the breast appears to float. Nursing is not painful, the breast itself being unaffected. The surrounding tissues may be dissected up by the spread of the deeply confined pus. The fever and constitutional disturbance are higher than the amount of inflamed tissue would seem to warrant, due in part to the reabsorption of the purulent fluid, and also to the irritation of the easily disturbed mammary nerves.

Mastitis of any kind may occur after the puerperal period, but the causes decrease greatly in number after that time.

Treatment.—The majority of all cases of mastitis are avoidable by proper attention to hygiene, especially of the nipples. The nipples should be kept clean, and otherwise protected from irritation, the child should nurse at regular intervals; large and

pendulous breasts should be supported by a handkerchief bandage.

Interlobular and subglandular mastitis cannot, as a rule, be arrested, when the inflammation has once begun. The process is rapid, and the best treatment is to apply a poultice to assist the abscess to "point," meanwhile relieving pain by opiates. As soon as fluctuation can be detected, an incision should be made to liberate the pus. This saves suffering, time, and tissue, and the physician should firmly insist upon making it. The incision should be made in a line radiating from the nipple to the circumference of the breast. In this way the risk is lessened of cutting across a milk-duct and causing a lacteal fistula.

In parenchymatous mastitis there is a better field for preventive treatment. There is usually a hard and tender lump in the breast for some time before suppuration occurs. Massage is the most efficient agent if it can be used. By stroking, rubbing, and kneading the breast the blood stasis may be removed and the inflammation be prevented or cured, if suppuration has not already taken place. Even then the extent of the inflammation may be limited. It certainly seems at first sight rash and even foolish to attempt to make kneading pressure upon a breast so tender and painful that the patient shrinks even from the approach of the hand. Nevertheless it can be done, if the patient can summon up a little resolution, and if the physician is not awkward. The first step is to place the open hand lightly upon the breast with a clasping movement, very gently, then the thumb and fingers are made to press and stroke

the breast with a centripetal motion, as if forcing the milk from the remote lobules to the nipple. As the patient tolerates the pressure it can be made more firmly, and a kneading of the hardened mass will finally be allowed. Both hands may be usefully employed, and should be lubricated before beginning with some unguent, preferably belladonna ointment, because it has some slight influence upon the inflammation. To apply pressure evenly, gently, and firmly, requires a trained touch. In some cities a professional nurse can be obtained for this purpose, but in general the physician must do it, or it will not be done. The rubbing results in overcoming the blood stasis and in emptying the milk-ducts, the latter alone sometimes removing the *fons et origo*. When massage is successful, there are few more brilliant operations in the healing art. To find a woman in torture, and to leave her comfortable, and with a threatening inflammation under control, is a pleasant thing. For various reasons it does not always succeed, and largely because it is an art which cannot be taught by word of mouth, neither are the exact movements in one case those appropriate for another. We must, therefore, have other resources more generally applicable. A solution of atropia (gr. ij to f℥j) applied on a light cloth, is of value in any accessible inflammation. Heath uses extract of belladonna with equal parts of glycerin, which is neither as uniform nor as easily absorbed as the atropia. Thorough compression of the breast by a bandage or plaster-of-Paris dressing is highly recommended, but is more suitable for the chronic indurations met with after suppuration than

in the earlier stages. Gaunt[1] recommends the ointment of the iodide of lead freely applied, as tending to diminish the secretion of milk and the hyperæmia of the breast. He also uses sulphide of calcium internally to control suppuration. Corson and others strongly advocate the continuous application of ice in a rubber bag. When suppuration is an accomplished fact, as evidenced by the occurrence of rigors and high temperature, if fluctuation cannot be detected, a poultice may be applied. This will hasten the pointing, as a rule, as well as assist in relieving the pain. But if after a brief period of poulticing we have not attained our object, the poultice should be discarded, at least for a time. It has a tendency, when the inflammation is deep-seated, to make the intervening tissue œdematous, boggy, sodden, and is more likely to destroy tissue than to give assistance, if it does not promptly "draw" the pus to the surface. When convinced of the presence of pus, even when fluctuation cannot be elicited, we should after a day's poulticing, rarely more, make an incision deeply and freely in the inflamed mass. Even if pus has not formed, the relief from tension and the bloodletting will do good. We have then to await the casting out of necrosed tissue in greater or less amount, and the healing of the inflamed tract from the bottom up. The wound should be kept covered with a cloth or wad of cotton batting, or more antiseptically dressed at the fancy of the attendant. Compression of the breast by a bandage will be of service. The suppurating tract should be

[1] Am. Journ. of Obstetrics, Oct. 1882.

washed out daily with a two per cent. solution of carbolic acid, or other cleansing fluid, and if it is slow to heal, a small catheter or similar tube should be carried to the bottom of the sinus, when the injection is made. Throughout the case the breast must be supported in a sling, and it is of great importance that any coexisting disease of the nipple should be treated.

During the treatment of mastitis it will often be a perplexing question as to what to do with the child. Nursing from the inflamed breast in parenchymatous mastitis must be stopped, though many a mother will suffer martyrdom in an attempt to keep it up. It not only increases the pain and weakness, but also the hyperæmia of the breast. Neither is the child benefited by it. If the sound breast can be kept in use, there is a chance for the resumption of the function after the inflammation has subsided. It is seldom necessary to draw the milk artificially from the inflamed breast. Massage, that is, manipulation of the breast analogous to that employed in milking a cow, is the best method when the mother can do it herself. Otherwise a breast pump may be used. There is some diversity of opinion concerning the possibilities for injury possessed by various breast pumps, but I have never seen any harm whatever follow the use of a wide-mouthed pump which does not press upon the areola. It is always well before using a breast pump to wash the nipple so as to make sure that the orifices of the ducts are not closed by dried secretions as sometimes happens.

Sore Nipples.—The nipples are subjected to much strain by the sucking and biting of the infant. When the skin is tender, as is often the case in primiparæ, an abrasion is very likely to result if no precautions are taken. A single abrasion may cause much pain and discomfort. It may be made worse and become an ulcer if the irritation be continued, if septicæmia or other cause of poor blood is developed, or if the child has thrush or stomatitis. Another cause of ulcer is eczema, in which a vesicle appears first and is succeeded by an ulcer usually in the form of a crack or fissure. Chancre and other diseases may affect the nipples, but the foregoing are the principal sources of this harassing affection. Some nipples not only cause great pain whenever the child nurses, but also lead to hyperæmia of the breasts, and thus cause mastitis. Also the act of suckling is postponed as long as possible, and the breast may, therefore, become clogged.

Prevention is elsewhere alluded to. If the nipple is kept clean and dry, its chances to escape are greatly increased. When the nipple is tender, it should be hardened by being bathed in whiskey, or in a mixture of glycerin and tannin.

The nipples are sometimes so short that they require much tugging at to be serviceable, in which case they are likely to become sore; also, the child may become discouraged and abandon the attempt to suckle. Such nipples can usually be sufficiently elongated by traction with the finger and thumb, frequently employed. This should, if possible, be attended to during the pregnancy.

The cure of sore nipples is sometimes a tedious

process. The general health should receive attention. Many different local applications have been used, but none is better than the tincture of benzoin when the nipple is continued in use. It should be applied with a camel's-hair brush over the whole nipple except the apex, so as not to cover the lactiferous orifices. In a few moments when this has dried another coat may be applied and so on until a stout pellicle has been formed. This being waterproof and insoluble will not prevent the child from nursing, which cannot be said of any other application. But, even with this defence, the irritation of the act of suckling tends to keep up the inflammation, and it will generally be found that the shortest way to heal sore nipples of any description is to stop nursing from the affected breast altogether. This alone will commonly suffice to effect a cure, and in a few days. Should the healing be slow, it may be hastened by the use of a carbolated oxide of zinc ointment or by the benzoin, if there is only an abrasion. Meanwhile, the breast pump is to be used, both to prevent the retention of the milk and to secure the latter for the child's use. Rubber nipples or sheaths are sometimes worn over the natural ones to protect them from contact with the child's mouth. They serve a useful purpose in some cases, and it may be well to try them before resorting to the cessation of nursing. There is not a great risk of "drying up" the milk by temporarily suspending or slackening the flow, but, even if there was, an inveterate case of sore nipples is an ample justification for the act.

We sometimes desire to stop the function of lacta-

tion, as after a stillbirth or the early death of the child. The nipples may be absent or even inverted. The secretion of milk may be too abundant (galactorrhœa), in which case it is commonly of poor quality. Under any of these circumstances, the patient should diminish the amount of fluids ingested as much as possible. Coffee appears to lessen the flow and belladonna, either internally or as a local application, may be used. Playfair recommends the iodide of potassium. The breast pump or massage should be used sparingly, but enough to prevent the retention of the milk.

Agalactia.—On the other hand, it is sometimes desirable to increase the flow of milk, the supply being insufficient for the child. Fluids, such as weak tea used freely, have some effect, and, as R. P. Harris has shown, milk is the best milk producer. A little lime-water added to it will prevent it from disagreeing with the mother and also furnish an additional source of lime for the extensive wants of the child in that direction. Beer, porter, and the like beverages are delusive aids and should not be used for the sake of the child. The leaves of the castor oil plant have a tropical reputation as a galactogogue, and oranges also are said to increase the supply of milk.

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